Government
Publications

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SESSIONAL PAPERS.

VOL. XXXIV.—PART IV.

FIFTH SESSION, NINTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO

SESSION 1902.

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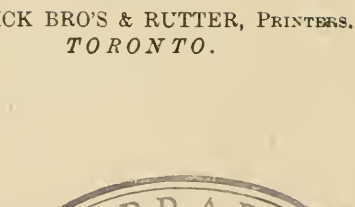

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LIST OF SESSIONAL PAPERS.

ARRANGED ALPHABETICALLY.

TITLE.	No.	REMARKS.
Accounts, Public, 1901	1	*Printed.*
Agricultural College, Report	14	"
Agricultural and Experimental Union, Report	15	"
Assessment Commission, Report	48	"
Asylums, Report	38	"
" amount received for support of patients	55	*Not printed.*
Bee-Keepers Association, Report	20	*Printed.*
Birds of Ontario, in relation to Agriculture	56	*Printed* (*for distribution only*)
Births, Marriages and Deaths, Report	9	*Printed.*
Blanche River Pulp Co'y. Agreement	68	"
Blind Institute, Report	41	"
Children's Protection Act, Report	43	*Printed.*
" " Visiting Committees	70	*Not printed.*
Cold Storage Associations	73	"
Colonization, Report	32	*Printed.*
Crown Lands, Report	3	"
Dairymen's Associations, Report	22	*Printed.*
Deaf and Dumb Institute, Report	42	"
Division Courts, Report	33	"
Doyle, Judge, Surrogate fees	52	*Not printed.*
Education, Report	12	*Printed.*
Elections, Return from Records	46	"
Entomological Society, Report	19	"
Estimates, 1902	2	"
Factories, Report	8	*Printed.*
Fairs and Exhibitions, Report	26	"
Farmers Institutes, Report	25	"
Fisheries, Report	31	"
" appointees, Rideau waters	60	*Not printed.*
Forestry, Report	4	*Printed.*
Fruit Experiment Stations, Report	17	"
Fruit Growers Association, Report	16	"
Fumigation Appliances, Report	18	"
Game Commission, Report	30	*Printed.*
Gaols, Prisons, etc., Report	39	"
" persons confined in	59	*Not printed.*

TITLE.	No.	REMARKS.
Gas Export—E sex	66	*Not printed.*
Grand River, damage by ice, etc	69	"
Guardian *ad litem*, account of	50	"
Health, Board of, Report	36	*Printed.*
Highways Commissioner, Report	27	"
Hospitals, Report	40	"
Imperial Statutes, compilation	49	*Printed.*
Industries, Report	28	"
Insurance, Report	10	"
Jennings, W. J., Report *re* Grand River floods	69	*Not printed.*
Judicature Act, O. in C., commutation	52, 76	"
	51	
Klein, Judge, O. in C., commutation	76	*Not printed.*
Labour, Report	29	*Printed.*
Legal Offices, Report	34	"
Library, L. A., Report	47	*Not printed.*
License Commissioners and Inspectors, names	61	"
Liquor Licenses, Report	44	*Printed.*
Live Stock Associations, Report	23	"
" Registrar of, Report	24	"
Loan Corporations, Report	11	"
McKinnon, A. M., commutation	51	*Not printed.*
McNab Lumbering Co'y., correspondence	65	"
Mad and Nottawasaga Rivers, overflow	75	"
Mines, Report	5	*Printed.*
Montreal River Pulp Co'y., agreement	71	"
Municipal Auditor, Provincial, Report	45	"
Nepigon Pulp Co'y., agreement	64	*Printed.*
Poultry Associations, Report	21	*Printed.*
Prisons and Reformatories, Report	39	"
Provincial Municipal Auditor, Report	45	"
Public Accounts, 1901	1	"
Public Works, Report	7	"
Queen Victoria Niagara Falls Park, Report	6	*Printed.*
Railways, bonuses and subsidies voted	58	*Not printed.*
Registrar General, Report	9	*Printed.*
Registry Offices, Inspectors report	35	"
Roadmaking, Report	27	"
San José Scale, Report	54	*Printed.*
San José Scale, trees infested with, and destroyed	57	*Not printed.*

Title.	No.	Remarks.
Scott enquiry, Report	62	*Not printed.*
Secretary and Registrar, Report	37	*Printed.*
Smallpox outbreak	53	*Not printed.*
Statutes, compilation of Imperial	49	*Printed.*
" distribution of	72	*Not printed.*
Sturgeon Falls Pulp Co'y., agreement	67	*Printed.*
Sugar Beet, Report	63	"
Sunnidale, Flos, drowned lands in	75	*Not printed.*
Temiskaming Railway, survey of route	74	*Not printed.*
Timber, McNab Lumbering Co'y., correspondence	65	"
Toronto University, Report	13	*Printed.*

LIST OF SESSIONAL PAPERS.

Arranged in Numerical Order with their Titles at full length ; the dates when presented to the Legislature ; the name of the Member who moved the same, and whether ordered to be printed or not.

CONTENTS PART I.

No. 1.. Public Accounts of the Province for the year 1901. Presented to the Legislature, 20th January, 1902. *Printed.*

No. 2.. Estimates (*Vote of Credit*) for the year 1902. Presented to the Legislature, 16th January, 1902. *Not Printed.* Estimates for the year 1902. Presented to the Legislature, 20th January, 1902. *Printed.* Estimates (Supplementary.) Presented to the Legislature, 6th March, 1902. *Printed.* Estimates (Further Supplementary.) Presented to the Legislature, 13th March, 1902. *Printed.*

No. 3.. Report of the Commissioner of Crown Lands, for the year 1901. Presented to the Legislature, 17th February, 1902. *Printed.*

No. 4.. Report of the Clerk of Forestry for the years 1900-1901. Presented to the Legislature, 6th February, 1902. *Printed.*

CONTENTS PART II.

No. 5.. Report of the Bureau of Mines, for the year 1901. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 6.. Report of the Commissioners for the Queen Victoria Niagara Falls Park, for the year 1901. Presented to the Legislature, 28th January, 1902. *Printed.*

No. 7.. Report of the Commissioner of Public Works for the year 1901 Presented to the Legislature, 11th February, 1902. *Printed.*

No. 8.. Report of the Inspectors of Factories, for the year 1901. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 9.. Report upon the Registration of Births, Marriages and Deaths in the Province for the year 1901. Presented to the Legislature, 21st February, 1902. *Printed.*

CONTENTS PART III.

No. 10.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1902. Presented to the Legislature, 5th March, 1902. *Printed.*

No. 11.. Financial Statements made by Building Societies, Loan Companies, Loaning Land Companies and Trust Companies for the year 1901. Presented to the Legislature, 5th March. 1902. *Printed.*

CONTENTS PART IV

No. 12.. Report of the Minister of Education—Parts I and II—for the year 1901, with the Statistics for the year 1900. Presented to the Legislature, 13th January, 1902. *Printed.*

No. 13.. Report of the University of Toronto, Auditors Report on Capital and Income Accounts for the year ending 30th June, 1901. Presented to the Legislature, 9th January, 1902. *Printed.*

No. 14.. Report of the Ontario Agricultural College and Experimental Farm, for the year 1901. Presented to the Legislature, 18th February, 1902. *Printed.*

No. 15.. Report of the Agricultural and Experimental Union of Ontario, for the year 1901. Presented to the Legislature, 4th March 1902. *Printed.*

No. 16.. Report of the Fruit Growers Association for the year 1901. Presented to the Legislature, 4th March 1902. *Printed.*

No 17.. Report of the Fruit Experiment Stations of Ontario, for the year 1901. Presented to the Legislature, 11th February, 1902. *Printed.*

No. 18.. Report of the Inspector of Fumigation Appliances in Ontario, for the year 1901. Presented to the Legislature, 14th February, 1902 *Printed.*

CONTENTS PART V.

No. 19.. Report of the Entomological Society for the year 1901. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 20.. Report of the Bee-Keepers Association for the year 1901. Presented to the Legislature, 5th March, 1902. *Printed.*

No. 21.. Report of the Poultry Association for the year 1901. Presented to the Legislature, 27th February, 1902. *Printed.*

No. 22 .. Report of the Dairymen's Association for the year 1901. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 23.. Report of the Live Stock Breeders' Association for the year 1901. Presented to the Legislature, 22nd February, 1902. *Printed.*

No. 24.. Report of the Registrar of Live Stock for the year 1901. Presented to the Legislature, 4th March, 1902. *Printed.*

CONTENTS PART VI.

No. 25.. Report of the Farmers' Institutes of the Province for the year 1901. Presented to the Legislature, 13th January, 1902. *Printed.*

No. 26.. Report of the Canadian Association of Fairs and Exhibitions for the year 1901. Presented to the Legislature, 13th January, 1902. *Printed.*

No 27.. Report of the Commissioner of Highways for the year 1901. Presented to the Legislature, 6th March, 1902. *Printed.*

No. 28.. Report of the Bureau of Industries for the year 1901. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 29.. Report of the Bureau of Labour for the year 1901. Presented to the Legislature, 27th February, 1902. *Printed*

CONTENTS PART VII

No. 30. Report of the Ontario Game Commission for the year 1901. Presented to the Legislature, 21st January, 1902. *Printed.*

No. 31.. Report of the Department of Fisheries for the year 1901, Presented to the Legislature, 28th February, 1902. *Printed.*

No. 32.. Report of the Director of Colonization for the year 1901. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 33.. Report of the Inspector of Division Courts for the year 1901. Presented to the Legislature, 29th January, 1902. *Printed.*

No. 34.. Report of the Inspector of Legal Offices for the year 1901. Presented to the Legislature, 20th January, 1902. *Printed.*

No. 35.. Report of the Inspector of Registry Offices for the year 1901. Presented to the Legislature, 14th February, 1902. *Printed.*

CONTENTS PART VIII.

No. 36.. Report of the Board of Health for the year 1901. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 37.. Report of the Secretary and Registrar of the Province for the year 1901. Presented to the Legislature, 9th January, 1902. *Printed.*

No. 38.. Report upon the Lunatic and Idiot Asylums of the Province for the year ending 30th September, 1901. Presented to the Legislature, 14th February, 1902. *Printed.*

No. 39.. Report upon the Common Gaols, Prisons and Reformatories of the Province for the year ending 30th September, 1901. Presented to the Legislature, 14th February, 1902. *Printed.*

No. 40.. Report upon the Hospitals, Refuges, etc, of the Province for the year ending 30th September, 1901. Presented to the Legislature, 5th March, 1902. *Printed.*

CONTENTS PART IX.

No. 41.. Report upon the Ontario Institution for the Education of the Blind, Brantford, for the year ending 30th September, 1901. Presented to the Legislature, 13th January, 1902. *Printed.*

No. 42.. Report upon the Ontario Institution for the Education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1901. Presented to the Legislature, 13th January, 1902. *Printed.*

No. 43.. Report upon the work under the Children's Protection Act for the year 1901. Presented to the Legislature, 27th February, 1902. *Printed.*

No. 44.. Report of the Inspector of Liquor Li enses for the year 1901. Presented to the Legislature, 9th January, 1902. *Printed.*

No. 45.. Report of the Provincial Municipal Auditor for the year 1901. Presented to the Legislature, 9th January, 1902. *Printed.*

No. 46.. Return from the Records of the several elections to the Legislative Assembly in the Electoral Districts of South Perth, North Waterloo, London, East Kent and West Huron, since the General Election of March 1st, 1898, shewing:—(1) The number of Votes polled for each Candidate in the Electoral District in which there was a contest. (2) The majority wh reby each successful Candidate was returned. (3) The total number of Votes polled in each District. (4) The number of names on the Voters' Lists in each District. (5) The population of each District as shewn by the last Census. Presented to the Legislature, 9th January, 1902. *Printed.*

No. 47.. Report of the Legislative Librarian on the State of the Library. Presented to the Legislature, 8th January, 1902. *Not Printed.*

No. 48.. Report of the Assessment Commission 1902. Presented to the Legislature, 19th February, 1902. *Printed.*

No. 49.. Copy of Order in Council and Report of Committee *re* Compilation of the Imperial Statutes in force in the Province, under the provisions of Chapter 111, R.S.O., 1897, and now contained in Vol. III. R.S.O. Presented to the Legislature, 9th January, 1902. *Printed for Sessional Papers only.*

No. 50.. Account of the Official Guardian *ad litem* for the year 1901. Presented to the Legislature, 13th January, 1902. *Not Printed.*

No. 51.. Copy of Order in Council respecting the commutation of fees of A. M. McKinnon, Local Master and Registrar at Guelph. Presented to the Legislature, 15th January, 1902. *Not Printed.*

No. 52.. Copy of Order in Council respecting payment to His Honour B. L. Doyle, Junior Judge of the County of Huron, of the surplus Surrogate fees of the County. Presented to the Legislature, 15th January, 1902. *Not Printed.*

No. 53.. Return to an Order of the House, for a Return shewing:—(1) In what municipalities and unorganized districts has smallpox appeared in Ontario since January 1st, 1900. (2) What has been the source of the outbreak in each case. (3) What action was taken by the Government of the Province in the different outbreaks to prevent the spread of the disease. (4) To what extent was vaccination employed in the different outbreaks to limit the spread of the disease. (5) In how many plac s do Isolation Hospitals exist. (6) And whether (a) temporary or (b) permanent. (7) In how many centres in (a) organized districts, and (b) unorganized. Presented to the Legislature, 15th January, 1902. Mr. *Smith. Not Printed.*

No. 54.. Report of Inspector of San José Scale for the year 1901. Presented to the Legislature, 25th February, 1902. *Printed.*

No. 55.. Return to an Order of the House for a Return, shewing what amount, if any, has been received from private parties towards the support of their relatives or otherwise, in the respective Insane Asylums of the Province during the year 1901. Presented to the Legislature 24th January, 1902. Mr. *Hoyle. Not Printed.*

No. 56.. The Birds of Ontario in relation to Agriculture. Presented to the Legislature, 29th January, 1902. *Printed for distribution only.*

No. 57.. Return to an Order of the House for a Return, shewing the number of fruit trees infested by the San José Scale, condemned to be destroyed by the Inspector or Inspectors in the County of Lincoln, the number actually destroyed; the number condemned but not destroyed; the names and residence of the owners of those not destroyed and the reason why not destroyed. Presented to the Legislature, 30th January, 1902. Mr. *Jessop. Not Printed.*

No. 58.. Return to an Order of the House for a Return, shewing:—(1) The amount of bonuses or subsidies voted to Railways by this Legislature, each year during 1898, 1899, 1900 and 1901. (2) The names of each railway receiving the same and the amount voted to each during that time. (3) The amount paid to each railway during each of such years, and the condition or conditions upon which such payments were made. Presented to the Legislature, 6th February, 1902. Mr. *Joynt. Not Printed.*

No. 59.. Also—Return to an Order of the House for a Return, shewing the number of persons confined in the different Gaols of the Province on January 14th, 1902, as indigent persons unable to support themselves, and the length of time each person had been confined. Also, shewing the number of insane persons confined in the different Gaols of the Province on January 14th, 1902; the length of time so confined, and the reason therefor. Presented to the Legislature, 6th February, 1902. Mr. *Barr. Not Printed.*

No. 60.. Return to an Order of the House for a Return, shewing:—(1) Who are the appointees under the Fisheries Department over the Rideau waters. (2) The name and the amount of salary of each overseer and sub overseer between Kingston and Ottawa. (3) The local jurisdiction of each overseer and sub-overseer, separately, as to limit of waters. (4) The number of licenses which have been granted during 1900 and 1901. (5) The name of each licensee and the amount paid for license individually. (6) The other sources of revenue under the Fisheries Department from fishing and otherwise for Ontario, from the Rideau waters. (7) The total revenue and expenditure in connection with the said waters under the Department. Presented to the Legislature, 7th February, 1902. Mr. *Joynt. Not Printed.*

No. 61.. Return to an Order of the House for a Return, giving the name of each License Commissioner in each License District in the Province and the amount of expenses allowed in each District, up to the 30th

April, 1901. The name and salary of each License Inspector in the Province up to the 30th April, 1901, the county for which he was appointed and the amount allowed each Inspector for expenses. Presented to the Legislature, 10th February, 1902 Mr. *Barr*. *Not Printed.*

No. 62.. Report in the matter of the Scott Enquiry *re* timber. Presented to the Legislature, 13th February, 1902. *Not Printed.*

No. 63.. Report on Sugar Beet Experiments in Ontario. Presented to the Legislature, 4th March, 1902. *Printed.*

No 64.. Agreement between His Majesty, represented by the Commissioner of Crown Lands, of the one part, and the Nepigon Pulp, Paper and Manufacturing Company, Limited, of the other part. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 65.. Return to an Address to His Honour the Lieutenant-Governor, praying that he will cause to be laid before this House, a Return of copies of all Orders-in-council, correspondence and telegrams between the Government, or any official thereof, and the McNab Lumbering Company, Peter Ryan, John Bell, John Drynan, and any other person or persons, interested in the company, relating to certain lumber stored at Ingoldsby Station, and the timber dues thereon. Presented to the Legislature, 18th February, 1902. Mr. *Fox*. *Not Printed.*

No. 66.. Return to an Order of the House for a Return, of copies of all correspondence since January 1, 1901, between the Attorney-General, or any officer of his Department, and any other person or persons, relating to the export of gas from the Province under any lease: also, copy of such lease; also, copy of any instructions to, and any report made by Mr. Stiff on the subject since said date: also, copy of any injunction served on the Sheriff of the County of Essex forbidding him to interfere with the pipes of any Gas Company. Presented to the Legislature, 18th February, 1902. Mr. *Whitney*. *Not Printed.*

No. 67.. Agreement between His Majesty, represented by the Commissioner of Crown Lands, of the one part, and the Sturgeon Falls Pulp Company, Limited, of the other part. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 68.. Agreement between His Majesty, represented by the Commissioner of Crown Lands, of the one part, and the Blanche River Pulp and Paper Company, Limited, of the other part. Presented to the Legislature, 4th March, 1902. *Printed.*

No. 69.. Report of W. T. Jennings, Esquire, M.S.C.E., upon the cause of damage by high water and ice in the Grand River at Galt, Ontario. Presented to the Legislature, 25th February, 1902. *Not Printed.*

No. 70.. Return to an Order of the House for a Return, shewing the number of Visiting Committees appointed under the provisions of the Act respecting Neglected and Dependent Children. Presented to the Legislature, 27th February, 1902. Mr. *Smith*. *Not Printed.*

No. 71.. Agreement between His Majesty, represented by the Commissioner of Crown Lands, of the one part, and the Montreal River Pulp and Paper Company, of the other part. Presented to the Legislature, 5th March, 1902. *Printed.*

No. 72.. Statement of distribution of Revised and Sessional Statutes, up to 31st December, 1901. Presented to the Legislature, 4th March, 1902. *Not Printed.*

No. 73.. Return to an Order of the House, for a Return, shewing what number of Cold Storage Associations have been incorporated: where they are, and what amount was paid by the Province to each of the Associations formed under the Act of 1900, to provide for the incorporation of Co-operative Cold Storage Associations. Presented to the Legislature, 5th March, 1902. Mr. *McLaughlin.* *Not Printed.*

No. 74.. Return to an Order of the House for a Return, a copy of any Report, or other document, made to any Department of the Government by the engineer, or other officer or person, who surveyed the route of the proposed Temiskaming Railway. Presented to the Legislature, 7th March, 1902. Mr. *Beatty (Leeds.)* *Not Printed.*

No. 75.. Return to an Order of the House for a Return, of copies of all correspondence between any person or persons resident in the Townships of Sunnidale, Flos or Vespra, and the Government or any member or official thereof, relating to the drowning of lands therein caused by the overflow of the Mad and Nottawasaga Rivers, together with a copy of the Report of the Engineers upon the cause of such overflow or floods. Presented to the Legislature, 10th March, 1902. Mr. *Thompson.* *Not Printed.*

No. 76.. Copy of an Order-in-Council commuting the fees of His Honour A. B. Klein, Junior Judge of the County Court of Bruce. Presented to the Legislature, 15th March, 1902. *Not Printed.*

REPORT

OF THE

MINISTER OF EDUCATION,

PROVINCE OF ONTARIO,

FOR THE YEAR 1901.

PART I.

(WITH THE STATISTICS OF 1900.)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON.
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1902.

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TABLE OF CONTENTS.

PART I.

PAGE.

STAFF OF THE DEPARTMENT ... ii.

SUMMARY OF STATISTICS ... iii.

I.—PUBLIC SCHOOLS.

1. School Population, Attendance ... v.

2. Classification of Pupils, Temperance and Hygiene ... v.

Kindergartens, Night Schools ... vi.

3. Teachers' Certificates, Salaries ... vi.

4. Receipts and Expenditure ... vii.

II.—ROMAN CATHOLIC SEPARATE SCHOOLS ... vii.

III.—PROTESTANT SEPARATE SCHOOLS ... vii.

IV.—COLLEGIATE INSTITUTES AND HIGH SCHOOLS.

1. Receipts, Expenditure, Attendance, etc ... viii.

2 Classification, Matriculation, etc ... viii.

Diffusion of H. S. Education, Occupation of Parents ... ix.

V.—DEPARTMENTAL EXAMINATIONS, ETC ... ix.

VI.—TEACHERS' INSTITUTES ... x.

VII.—TECHNICAL EDUCATION—Public Libraries, Art School, Scientific Institutions, etc. xi.

GENERAL REMARKS:

I.—THE REGULATIONS ... xii.

II.—COURSES OF STUDY ... xiv.

III.—TRAVELLING LIBRARIES ... xvii.

IV.—SCHOOL LIBRARIES ... xx.

V.—CONTINUATION CLASSES ... xxiii.

VI.—HIGH SCHOOLS ... xxv.

VII.—TECHNICAL EDUCATION ... xxix.

VIII.—CONCLUSION ... xxxiii.

APPENDICES.

APPENDIX A.—STATISTICAL TABLES, 1900.

1. *Public Schools.*

I.—TABLE A.—School Population, Total and Average Attendance, etc ... 3

II.—TABLE B.—Reading Classes—Pupils in the various branches of instruction ... 6

III.—TABLE C.—Teachers, Salaries, Certificates, etc ... 12

IV.—TABLE D.—School Houses, Prayers, Maps, etc ... 14

V.—TABLE E.—Financial Statement, Cost per pupil ... 16

2. *Roman Catholic Separate Schools.*

I.—TABLE F.—Financial Statement, Teachers, etc ... 22

II.—TABLE G.—Attendance, Pupils in the various branches of instruction, Maps, etc. 26

3. *Collegiate Institutes and High Schools.* PAGE.

I.—Table H.—Financial Statement, Charges per year, Cost per pupil, etc 30
II.—Table I.—Attendance, Pupils in the various branches of instruction, and examination results 36
III.—Table K.—Miscellaneous, School Houses. Pupils in the different Forms, etc . 48

4. *Protestant Separate Schools.*

Table L.—Protestant Separate Schools 54

5. *Miscellaneous.*

Table M.—Report on Truancy 55
Table N.—Report on Kindergartens 56
Table O.—Report on Night Schools 56

6. *General Statistical Abstract.*

Table P.—General Statistical Abstract 57

Appendix B.—Teachers' Institutes, Financial Statement, 1900 58

Appendix C.—Continuation Classes, 1900-1901 60

Appendix D.—Admission of Candidates to Collegiate Institutes and High Schools, 1901 67

Appendix E.—Inspection of Schools, 1901.

1. List of Inspectors 70
2. Diplomas for School Premises 73

Appendix F.—Proceedings for the Year 1901.

I.—Circulars and Regulations 73
Apportionment of Public School Grant 108
II.—Orders In Council 120
III.—Minutes of The Department 120

Appendix G.—Technical Education—Public and Free Libraries, Art Schools and Scientific Institutions, 1900.

Report of S. P. May, M.D., C.L.H., Superintendent 121
Libraries in the Province 123
I.—*Public Libraries (not free)* 126
II.—*Public Libraries (free)* 131
III.—*Art Schools and Departmental Drawing Examinations* 136

Art Schools.

1. Extract from Report of Hamilton Art School 146
2. do Report of Kingston Art School 146
3. London Art School 146
4. Extract from Report of St. Thomas Art School 146
5. do Report of Toronto Art School 147
6. do Report of Ontario Society of Artists 147
7. Provincial Art Gallery and Educational Museum 147

Literary and Scientific Institutions.

PAGE.

1. Report of the Hamilton Literary and Scientific Association 148
2. do Ottawa Literary and Scientific Society 149
3. do L'Institut Canadien Francais d'Ottawa 149
4. do St. Patrick's Literary and Scientific Association, Ottawa 150
5. do Ottawa Field Naturalists' Club 150
6. do Ottawa University Scientific Society 151
7. do Toronto Astronomical Society 151
8. do Canadian Institute, Toronto 151
9. do Ontario Historical Society 151

APPENDIX H.—DEPARTMENTAL LIBRARY, ETC., 1901.

Report of J. George Hodgins, M.A., LL.D., Librarian and Historiographer.

I.—EDUCATION LIBRARY 152

II.—HISTORIOGRAPHY 156

III.—SCHOOL ROOM DECORATION 158

Rat Portage Central Public School.

FORT WILLIAM CENTRAL PUBLIC SCHOOL.

GENERAL REPORT, 1901.

EDUCATION DEPARTMENT.

MINISTER OF EDUCATION:

HON. RICHARD HARCOURT, M.A., K.C.

DEPUTY MINISTER OF EDUCATION:

JOHN MILLAR, B.A.

H. M. Wilkinson,	Senior Clerk and Accountant.
H. R. Alley,	Clerk and Minister's Secretary.
A. C. Paull,	Senior Clerk.
Thos. J. Greene,	Clerk.
E. A. Faulds,	"
Allen Ker,	"
T. F. Callaghan,	"
R. J. Bryce,	"
F. Woodley,	"
Miss E. H. Brown,	Stenographer.
R. H. Macomb,	"
L. McCorkindale,	Caretaker.

Departmental Examinations.

Wm. Pakenham, B.A.,	Registrar.
J. T. R. Stinson,	Senior Clerk.
F. N. Nudel,	Secretary to Board of Examiners.
W. W. Jeffers,	Clerk.
S. A. May,	"

Public Libraries, Art Schools, &c.

S. P. May., M.D., C.L.H.,	Superintendent.
Wm. Lemon,	Clerk.

Library and Museum.

J. George Hodgins, L.L.D.,	Librarian and Historiographer.
David Boyle,	Curator of Museum.
Miss J. M. Crooks,	Assistant Librarian.

REPORT

OF THE

MINISTER OF EDUCATION

FOR THE YEAR 1901,

PART I.

WITH THE STATISTICS OF 1900.

To the Honorable Sir Oliver Mowat, K.C.M.G.,

Lieutenant Governor of the Province of Ontario.

May it Please Your Honor:

I herewith present Part I. of the Report of the Education Department for the year 1901, with the statistics for the year 1900.

SUMMARY OF STATISTICS.

**Elementary Schools.*

Number of Public Schools		5,655
Increase for the year	1	
Number of Roman Catholic Separate Schools		355
Increase for the year	3	
Number of Protestant Separate Schools		7
Number of Kindergartens		120
Number of teachers		250
Number of Night Schools		12
Number of teachers		21
Amount expended for Public School Houses (sites and buildings)		$359,138
" " Public School teachers' salaries		$2,809,246
" " all other purposes		$1,060,148

* The Curriculum of Elementary Schools embraces the following subjects: Reading, Writing, Arithmetic, Composition, Drawing, English Literature, Geography, Music, Grammar, History, Physiology and Temperance, Drill and Calisthenics, Bookkeeping, Algebra, Geometry, Botany, Elementary Physics, Agriculture.

Total amount expended on Public Schools		$4 228,532
Increase for the year	$208,484	
Number of persons in the Province between the ages of 5 and 21		580,105
Decrease for the year	6,245	
Number of registered pupils of all ages in the Public Schools during the year.		420,097
Decrease for the year	9,130	
Average attendance of pupils in the Public Schools during the year		237,306
Decrease for the year	6,019	
Number of pupils in Roman Catholic Separate Schools		42,397
Increase for the year	601	
Average attendance of pupils in Roman Catholic Separate Schools		25,875
Increase for the year	108	
Number of pupils in Protestant Separate Schools		416
Decrease for the year	25	
Average attendance of pupils in Protestant Separate Schools		238
Decrease for the year	8	
Number of pupils attending Kindergartens		11,234
Decrease for the year	28	
Average attendance of pupils in Kindergartens		4,639
Decrease for the year	62	
Number of pupils attending Night Schools		795
Decrease for the year	231	
Average attendance of pupils at Night Schools		165
Decrease for the year	97	
Percentage of average attendance to total attendance in Public Schools		56
Number of persons employed as teachers in the Public Schools during the year:		
Men, 2,539; women, 6,127; total		8,666
Decrease: men, 73; increase: women, 170; total increase.	97	
Number of teachers who have attended a Normal School		4,135
Increase for the year	330	
Average annual salary of male teachers in Public Schools		$404
Increase for the year	$10	
Average annual salary of female teachers in Public Schools		$298
Increase for the year	$4	

**Secondary Schools.*

Number of High Schools (including 38 Collegiate Institutes)	131
Number of teachers in High Schools	573
Increase for the year	5
Number of pupils in High Schools	21,723
Decrease for the year	737
Amount expended for High School teachers' salaries	$529,245
" " " houses (sites and buildings and repairs)	$32,400
" all other High School purposes	$156,956
Total amount expended on High Schools	$718,601

* The Curriculum of Secondary Schools includes all the subjects required for matriculation into the University.

I.—PUBLIC SCHOOLS.

These tables (for purpose of comparison with previous years in which the R. C. Separate Schools were included with Public Schools) include R. C. Separate Schools. In the Statistical Tables, A, B, C, D, E, the Separate Schools are excluded.

1.—School Population—Attendance.

The School population of the Province, as ascertained by the assessors, is as follows :

Year.	School age.	School Population.	Pupils registered under 5.	Pupils registered 5 to 21.	Pupils registered over 21.	Total number of registered pupils.	Average attendance.	Percentage of average attendance to total number attending school.
1867	5—16	447,726	.....	*380,511	†21,132	401,643	163,974	41
1872	5—16	495,756	.....	*433,664	†20 998	454,662	188,701	42
1877	5—16	494,804	1,430	488,553	877	490,860	217,184	44
1882	5—16	483,817	1,352	469,751	409	471,512	214,176	45
1887	5—21	611,212	1,569	491,242	401	493,212	245,152	50
1892	5—21	595,238	1,636	483,643	391	485,670	253,830	52
1897	5—21	590,055	1,385	481,120	272	482 777	273,554	56
1899	5—21	586 350	1,246	469,637	140	471,023	269,692	57
1900	5—21	580,105	1,111	461,258	125	‡462,494	263,181	57

* 5—16. † Other ages. ‡ In addition, there were 11,234 Kindergarten pupils and 795 Night School pupils.

It can be shown from the above table that 22 per cent. of the entire population are enrolled in our schools. From the last report of the American Commissioner of Education a little over 20 per cent. of the entire population attend school.

2.—Classification of Pupils.

Year.	1st Reader—Parts I and II.	2nd Reader.	3rd Reader.	4th Reader.	5th Reader.	Writing.	Arithmetic.	Drawing.	Geography.	History.	Music.	Grammar and Composition.	Temperance and Hygiene.
1867	79,365	98,184	83,211	68,896	71,987	231,734	241,501	5,450	272.173	61,787	47,618	147,412	.....
1872	160,828	100,245	96,481	67,440	29 668	322,688	327,218	57.582	327,139	109,639	110,083	282,156	.....
1877	153,630	108,678	135,824	72,871	19,857	396 006	402,748	153,036	375,951	116,865	168,942	226,977	.....
1882	165.834	106,229	117,352	71,740	10,357	398.401	419,557	176,432	280,517	150.989	158,694	209,184	33,926
1887	192 361	100,533	108,096	81,984	10,238	466,389	469,445	395,097	316,791	194,754	203,567	570,856	71,525
1892	187,947	96,074	99,345	88,934	13,370	465,516	470,813	435,239	334,947	253,956	220,941	294,331	171.594
1897	181,375	91,330	99,682	89,304	21,076	465,525	471,869	448,444	342,189	284,025	233,915	316,787	215,343
1899	174,442	93,076	97,702	86 500	19,303	462,012	464,820	444,486	331,184	275,520	242,619	306,257	209,187
1900	177,614	88,836	94,069	84,507	17,468	453,930	455,718	436,078	326,464	272,414	255,327	298,633	199,229

Temperance and Hygiene.

It is also worthy of notice that the number of pupils receiving instruction in Temperance and Hygiene has increased from 33,926, in 1882, to 199,229, in 1900. Having regard to the great importance of the knowledge of physiology and the injurious effects of alcoholic stimulants on the human system, provision was made by the statute in 1886 for placing this subject on the course of study for Public Schools. Instruction was also provided under departmental regulation for teachers-in-training at County Model Schools and Normal Schools, to be followed by an examination as an essential pre-requisite to their final recognition as duly qualified teachers. In 1893, this subject was made compulsory for entrance to High Schools and Collegiate Institutes, so that no pupil who pur-

sues his studies as far as the 5th Form can fail to be reasonably well acquainted with the conditions on which his health and physical vigor depend, as well as with the dangerous tendency of stimulants and narcotics to produte weakness and disease.

Kindergartens

The system of Kindergarten instruction, first introduced into Ontario in 1882, and subsequently made part of the School System of the Province, by the Public Schools Act of 1885, has met with encouraging success. A report of the pupils receiving instruction in this way was first made in 1892. The report showed that in the short space of ten years, 69 Kindergartens were established, with 160 teachers, attended by 6,375 children under six years of age. In 1900 the number of Kindergartens has increased to 120, with 250 teachers, attended by 11,234 pupils under seven years of age.

Night Schools.

The whole number of Night Schools in 1900 was 12, the number of teachers 21, and the number in attendance 795. This number does not include the attendance upon the classes established by Mechanics Institutes and Art Schools.

3 —Teachers' Certificates and Salaries.

Teachers' Certificates.

Year.	Public school teachers.	Male.	Female.	1st class.	2nd class.	3rd class.	Other certificates, including old County Board, etc.	Number of teachers who attended Normal Schools.
1867	4,890	2,849	2,041	1,899	2,454	386	151	666
1872	5,476	2,626	2,850	1,337	1,477	2,084	578	828
1877	6,468	3,020	3,448	250	1,304	3,926	988	1,084
1882	6,857	3,062	3,795	246	2,169	3,471	971	1,873
1887	7,594	2,718	4,876	252	2,553	3,865	924	2,434
1892	8,480	2,770	5,710	261	3,047	4,299	873	3,038
1897	9,128	2,784	6,344	343	3,386	4,465	934	3,643
1899	9,333	2,713	6,620	524	3,565	4,322	922	3,889
1900	9,440	2,630	6,810	581	3,851	3,927	1,081	4,175

**Teachers' Salaries.*

Year.	Highest salary paid.	Average salary, male teacher, province.	Average salary, female teacher, province.	Average salary, male teacher, counties.	Average salary, female teacher, counties.	Average salary, male teacher, cities.	Average salary, female teacher, cities.	Average salary, male teacher, towns.	Average salary, female teacher, towns.
	$	$	$	$	$	$	$	$	$
1867	1,350	346	226	261	189	532	243	464	240
1872	1,000	360	228	305	213	628	245	507	216
1877	1,100	398	264	379	251	735	307	583	269
1882	1,100	415	269	385	248	742	331	576	273
1887	1,450	425	292	398	271	832	382	619	289
1892	1,500	421	297	383	269	894	402	648	298
1897	1,500	391	294	347	254	892	425	621	306
1899	1,500	394	294	344	251	854	438	617	306
1900	1,500	404	298	349	255	892	455	624	309

*There is a slight increase in the salaries of teachers although the average is still low. In Ontario the average is $404 for males and $298 for females For the other provinces the averages are as follows :— Nova Scotia, $319 and $211 ; New Brunswick, $383 and $234 ; P.E.I., $400 and $340 ; Quebec, $552 and $128 ; Manitoba, $449 for both male and female teachers. In the United States the averages for males and females are $465 and $389 respectively.

4.—Receipt and Expenditure.

Year.	Receipts.				Expenditure.					
	Legislative grants.	Municipal school grants and assessments.	Clergy reserve funds, balances and other sources.	Total receipts.	Teachers' salaries.	Sites and building school houses.	Maps, apparatus, prizes, etc.	Rent, repairs, fuel and other expenses.	Total expenditure.	Cost per pupil.
	$	$	$	$	$	$	$	$	$	$ c
1867..	187,153	1,151,583	331,599	1,670,335	1,093,517	149,195	31,354	199,123	1,473,189	3 67
1872..	225,318	1,763,492	541,460	2,530,270	1,371,594	456,043	47,799	331,928	2,207,364	4 85
1877..	251,962	2,422,432	730,687	3,405,081	2,038,099	477,393	47,539	510,458	3,073,489	6 26
1882..	265,738	2,447,214	757,038	3,469,990	2,144,449	341,918	15,583	525,025	3,026,975	6 42
1887..	268,722	3,084,352	978,283	4,331,357	2,458,540	544,520	27,509	711,535	3,742,104	7 59
1892..	283,731	3,300,512	1,227,596	4,811,899	2,752,629	427,321	40,003	833,965	4,053,918	8 40
1897..	366,538	3,361,562	1,260,055	4,988,155	2,886,061	391,680	60,585	887,335	4,215,670	8 73
1899..	374,277	3,509,059	1,319,382	5,202,718	2,951,812	395,325	64,545	960,377	4,372,059	9 28
1900..	369,901	3,847,646	1,292,441	5,509,988	2,985,278	438,374	71,994	1,091,437	4,587,083	9 92

II.—ROMAN CATHOLIC SEPARATE SCHOOLS.

Year.	Schools—Expenditure—Teachers.				Number of pupils attending—Number in the various branches of instruction.							
	Schools open.	Total receipts.	Total expenditure.	Teachers.	Pupils.	Reading.	Writing.	Arithmetic.	Geography.	Grammar.	Drawing.	Temperance and Hygiene.
		$	$									
1867..	161	48,628	42,719	210	18,924	18,924	10,749	10,559	8,666	5,688	.....	.....
1872..	171	68,810	61,817	254	21,406	21,406	13,699	12,189	8,011	7,908	.....	.....
1877..	185	120,266	114,806	334	24,952	24,952	17,932	17,961	13,154	11,174	.....	.....
1882..	190	166,739	154,340	390	26,148	26,148	21,052	21,524	13,900	11,695	7,548	2,033
1887.	229	229,848	211,223	491	30,373	30,373	27,824	28,501	19,608	18,678	21,818	8,578
1892..	312	326,034	289,838	662	37,466	37,466	35,565	35,936	26,299	22,755	32,682	11,056
1897..	340	335,324	302,169	752	41,620	41,620	39,724	40,165	27,471	26,071	36,462	18,127
1899..	352	401,155	352,012	764	41,796	41,796	41,418	41,484	29,352	27,493	37,572	13,692
1900..	355	396,137	358,551	774	42,397	42,397	42,397	42,397	27,923	25,955	34,201	12,549

III.—PROTESTANT SEPARATE SCHOOLS.

The complete list of Protestant Separate Schools is as follows:

No. 5 Bromley, No. 9 Cambridge, No. 6 Plantagenet North, Puslinch, Rama, L'Orignal, Penetanguishene.

They were attended by 416 pupils. The whole amount expended for their maintenance was $4,061. Three teachers held a Second Class, six a Third Class, and one a Temporary Certificate.

IV.—COLLEGIATE INSTITUTES AND HIGH SCHOOLS.

The following statistics respecting Collegiate Institutes and High Schools will be found suggestive:

1.—Receipts, Expenditure, Attendance, Etc.

Year.	Schools Open.	Teachers.	Receipts.			Expenditure.			Pupils.	Percentage of average attendance to total attendance.	Cost per pupil.
			Amount of fees.	Legislative grant.	Total Receipts.	Paid for teachers' salaries.	Paid for sites and building school houses, rents and repairs.	Total expenditure.			
			$	$	$	$	$	$			$ c.
1867.....	103	159	15,605	54,562	139 579	94,820	19,190	124,181	5,696	55	21 80
1872.....	104	239	20,270	79,543	223,269	141,812	31,360	210.005	7,968	56	26 36
1877	104	280	20,753	78,762	357,521	211,607	51,417	343,710	9,229	56	37 24
1882	104	332	29,270	84,304	373,150	253,864	19,361	343,720	12,348	53	27 56
1887.....	112	398	56,198	91,977	529,323	327,452	73,061	495,612	17,459	59	28 38
1892.....	128	522	97,273	100,000	793,812	472,029	91.108	696,114	22,837	60	30 48
1897.....	130	579	110,859	101,250	767,487	532,837	46,627	715,976	24,390	61	29 35
1899....	130	568	100,308	103,700	777,343	528,614	43.213	722,239	22,460	59	32 15
1900.....	131	572	98,726	103,200	772,332	529,245	32,400	718,602	21,723	60	33 08

2.—Classification, Etc

Year.	English.					Mathematics.				Science.		
	English Grammar and Rhetoric.	English Composition.	Poetical Literature.	History.	Geography.	Arithmetic and Mensuration.	Algebra.	Geometry.	Trigonometry.	Physics.	Chemistry.	Botany.
1867..	5,467	4,091	.....	4,634	5,264	5,526	2,841	1,847	141	1,876	840	.....
1872..	7,884	7,278	.....	7,513	7,715	7,834	6.033	2,592	174	1,921	1,151	... ..
1877..	8,819	8,772	.....	9,106	9,158	9,227	8,678	8,113	359	2,168	2,547	... ..
1882..	12,275	12,189	.....	12,220	12,106	12,261	11,742	11,148	397	2,880	2,522	.....
1887..	17,086	17,171	16,649	17,010	16,962	16,939	16,904	14,839	1,017	5,265	3,411	4 640
1892..	22,530	22,525	22,468	22,328	22,118	21,869	22,229	17,791	1,154	6,601	3,710	6,189
1897..	19,591	24,195	24,176	18,318	13,747	19,798	24,105	16,788	1,652	11,002	5,489	12,892
1899.	16,953	22,314	22,194	17,862	12,371	16,720	21,799	15,701	1,340	10,235	5,934	10,376
1900..	17,122	21,382	21,146	15,947	12,410	17,008	20,567	15,609	1,325	10,265	5,723	8,626

Year.	Languages.				Drawing.	Vocal Music.	Bookkeeping and commercial transactions.	Left for mercantile life.	Left for agriculture.	Who joined a learned profession.	Matriculated.	Number of schools charging fees.
	Latin.	Greek.	French.	German.								
1867.....	5,171	802	2,164	..	676	....	1,283	.....	....	.....	56	57
1872.....	3,860	900	2,828	341	2 176	.....	3,127	486	300	213	78	28
1877	4,955	871	3,091	442	2,755	. ..	3,631	555	328	564	145	35
1882.....	4,591	815	5,863	962	3,441	..	5,642	881	646	751	272	37
1887.....	5,409	997	6,180	1,350	14,295	1,955	14,064	1,141	882	791	305	58
1892.....	9,006	1,070	10,398	2,796	16,980	948	16,700	1,111	1,006	398	471	77
1897	16,873	1,421	13.761	5.169	12,252	160	11,647	1,368	1,153	409	652	87
1899.... .	19,131	1,176	13,464	5,513	10,240	136	10,625	1,449	944	467	814	84
1900.....	18,073	853	12,650	3,894	9,345	357	9,712	1,331	757	716	1,253	91

From a study of these tables, interesting views will be gathered regarding the progress and present condition of our High Schools and Collegiate Institutes. Owing to the organization of Continuation Classes in Public Schools, there has not been much increase of late years in the establishment of additional High Schools As Continuation Classes are really doing High School work, it may be seen that there is a steady progress in the support given to secondary education. In 1867 only 1,283 pupils, or 23 per cent. of the whole number, studied commercial subjects, such as Bookkeeping. In 1900 this subject was taken up by 9,712 pupils, or 45 per cent. of the total attendance. In 1867 5,171 pupils, or 90 per cent. studied Latin. In 1900 the number taking Latin was 18,073, or about 83 per cent. In 1867, 15 per cent studied Greek, while in 1900 only 4 per cent. were engaged in studying this subject. In 1867, 38 per cent of pupils studied French, and none studied German. In 1900 the number taking French had increased to 58 per cent., while 18 per cent. were engaged in studying German. The greater attention given to Drawing is also a marked feature of the classification.

When High Schools were first established in the Province, their primary object was to prepare pupils for the learned professions, and especially for the University. Although their original purpose has not been ignored, the course of study has been enlarged so as to meet the aims of pupils who intend to follow the ordinary pursuits of life. It is in the High Schools that most students who desire to become Public School teachers receive their non-professional training. This is a valuable function of those institutions and one that has done much to commend them to the general public Many young men also who intend to follow mechanical pursuits, or prepare themselves for mercantile life or for agriculture, take advantage of the High Schools. The superior culture which is thus received, proves a valuable investment. In 1872 the number of High School pupils entering mercantile life was 486 In 1900 the number had increased to 1,331. In 1872 300 pupils left the High Schools for agricultural pursuits, and the number in 1900 had reached 757.

The following table will be of interest regarding the occupation of parents of High School pupils, and will show the classes of our population receiving most advantages from those institutions.

Agricultural	6221
Commercial	5448
Mechanical	5054
Professional	1953
Without occupation	1788

V.—DEPARTMENTAL EXAMINATIONS, ETC.

1. Table Showing the Number of Teachers-in-Training at County Model Schools, Normal College, Provincial Normal Schools, Etc, 1877 1900.

Year.	County Model Schools.			Normal College.			Normal and Model Schools, etc.					
	No. of schools.	No. of teachers in training.	No. that passed final examination.	No. of teachers.	No. of students.	Receipts from fees of Normal College.	No. of Normal School teachers.	No. of Normal School students.	No. of Model School and Kindergarten teachers.	No. of Model School and Kindergarten pupils.	Receipts from fees of Normal Schools, Model Schools, and Kindergarten pupils.	Expenditure, Normal and Model Schools.
						$ c.					$ c.	$ c.
1877....	50	1,146	1,124	.....	.....	.....	13	257	8	643	7,909 22	25,780 88
1882....	46	882	837	.....	....	.....	16	260	15	799	13,783 50	44,888 02
1887....	55	1,491	1,376	.....	.....	..	13	441	18	763	16 427 00	40,188 66
1892....	59	1,283	1,225	10	96	1,630 00	12	428	22	842	19,016 00	45,724 12
1897....	60	1,645	1,384	12	180	4,374 00	13	447	23	832	18,797 59	46,390 91
1899 ...	59	1,051	978	12	148	1,845 00	10	478	25	863	19,903 00	46,835 03
1900	55	1,045	1,004	12	144	1 730 00	16	637	26	893	19,416 00	56,556 99

2 Entrance Examinations 1877 1901.

Year.	No. of candidates examined.	No of candidates who passed.
1877	7,383	3,836
1882	9,607	4,371
1887	16,248	9,364
1892	16,409	8,427
1897	16,384	10,502
1900	16,416	9,574
1901	17,149	12,229

3. Non-Professional and Matriculation Examinations, 1901.

—	High School Entrance.	Part I, Junior Leaving or Public School Leaving.	Part II, Junior Leaving.	Part I, Junior Matriculation.	Part II, Junior Matriculation.	Part I, Senior Leaving or Honor Matriculation.	Part II, Senior Leaving or Honor Matriculation.	Commercial Diploma Part II.	Commercial Specialist.	Domestic Science.
No. of candidates	17,149	5,340	2,494	1,365	976	594	542	258	7	18
No. who passed	12,229	3,531	1,617	1,042	609	411	315	63	1	6
No. of appeals	.....	23	134	13	16	28	34	7	....	1
Appeals sustained	.....	7	27	2	4	13	10	2	...	1

VI.—TEACHERS' INSTITUTES.

This table presents the work of the Teachers' Institutes for twenty-four years.

Year.	No. of Teachers' Institutes.	No. of Members.	No. of teachers in the Province.	Receipts.				Expenditure.	
				Amount received from Government grants.	Amount received from municipal grants	Amount received from members' fees	Total amount received.	Amount paid for libraries.	Total amount paid.
				$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1877	42	1,181	6,468	1,412 50	100 00	299 75	2,769 44	. . . .	1,127 63
1882	62	4,395	6,857	2,900 00	300 00	1,088 84	9,394 28	453 02	5,355 33
1887	66	6,781	7,594	1,800 00	1,879 45	730 66	10,405 95	1,234 08	4,975 50
1892	69	8,142	8,480	1,950 00	2,105 00	875 76	12,043 54	1,472 41	6,127 46
1897	73	7,627	9,128	2,425 00	2,017 45	901 15	12,446 20	1,479 88	6,598 84
1899	76	8,309	9,333	2,425 00	1,922 35	952 60	12,583 67	1,322 41	6,555 75
1900	76	8,081	9,440	2,475 00	1,767 50	966 95	12,431 62	1,177 12	6,485 10

The County teachers' associations are doing excellent work and at a trifling expenditure. In the United States it is not unusual for Teachers' Institutes to be held for a week or longer. The work attempted is, however, somewhat like what is done in our County Model Schools.

VII. TECHNICAL EDUCATION.—PUBLIC LIBRARIES, ART SCHOOLS, SCIENTIFIC INSTITUTIONS, ETC.

The change in the Act and Regulations requiring Annual Reports from Public Libraries to be made out to the end of each calendar year, has now been complied with. The present Report is from the 1st of January, to the 31st of December, 1900.

The following abstracts are from the Superintendent's Report:

1. Public Libraries.

Abstract showing the Counties and Districts in which Public Libraries are established:—Addington (5), Algoma (11), Brant (6), Bruce (23) Carleton (9), Dufferin (10), Dundas (7), Durham (4), Elgin (11), Essex (8), Frontenac (3), Glengarry (2), Grenville (9), Grey (19), Haliburton (2), Haldimand (11), Halton (5) Hastings (7), Huron (16), Kent (13), Lambton (14) Lanark (9), Leeds (4), Lennox (2), Lincoln (7), Manitoulin Island (3) Middlesex (13), Muskoka (4), Nipissing (4), Norfolk (6), Northumberland (8), Ontario (12), Oxford (13) Parry Sound (10) Peel (13), Perth (8), Peterborough (4), Prescott (1), Prince Edward (2), Rainy River (2), Renfrew (9), Russell (2) Stormont (5), Simcoe (16), Victoria (11), Waterloo (14), Welland (9), Wellington (17), Wentworth (8), York (21).

Abstract showing the Progress of Public Libraries from 1883 to 31st December, 1900

Year.	Institutes reporting.	Number of members.	Number of evening classes.	Number of pupils.	Number of reading rooms	Number of newspapers and periodicals.	Number of volumes in libraries.	Number of volumes issued.	Total receipts.		Total assets.	
									$	c.	$	c.
1883...(April) ...	93	13,672	28	1,758	59	1,540	154,093	251,920	59,716	00	225,190	00
1888... "	167	32,016	41	1,102	104	3,041	311,048	744,466	103,843	68	403,573	75
1893... " ...	255	84,088	41	1,117	156	4,745	510,326	1,415,867	160,556	26	685,412	17
1898... "	347	111,208	2	79	200	5,834	789,682	2,358,140	188,783	21	870,167	54
1899... "	364	121,397	2	35	200	5,839	862,047	2,547,131	193,421	20	935,975	81
1899. (December) .	371	129,713	2	47	188	5,773	918,022	2,042,904	178,642	87	966,667	38
1900.. "	389	147,205	2	35	186	5,971	989,050	2,534,711	210,635	49	1,024,300	14

389 Public Libraries (126 Free, 263 not Free) reported for the year ending 31st December, 1900.

25 Public Libraries did not report for the year ending 31st December, 1900.

18 Libraries, which have not yet reported, were established in the year 1901.

Total number of Libraries, 432.

2. Art Schools, etc.

During the year the London Art School has been temporally closed, and the Drawings, Casts, Paintings, etc., removed to the Normal School, London, until the Art School be re-opened.

The following Abstract shows the number of certificates and medals awarded to Art Schools, Ladies' Colleges, etc, for drawing, painting, etc, at intervals since 1883.

Year.	Number of Art Schools, etc.	Primary Art Course.		Advanced Art Course.		Mechanical Art Course		Industrial Art Course.	Extra subjects	Departmental medals, etc.			
		Proficiency certificates.	Full teachers' certificates.	Proficiency certificates.	Full teachers' certificates.	Proficiency certificates.	Full teachers' certificates.	Proficiency certificates.	Painting, modelling, wood-carving, etc	Gold medals.	Silver medals.	Bronze medals.	Special certificates.
1883.....	1	124	.....	31	.....	1	.....	.....	..	...	.....	...	...
1888.....	57	2,979	133	151	9	50	2	24	108	1	1	4	1
1893.....	85	4,753	220	301	13	139	10	11	165	1	16	11	21
1898.....	55	3,166	149	540	18	42		30	171	1	2	11	14
1899	62	3,993	160	499	22	75	....	42	154	1	3	10	14
1900	47	3,130	130	367	17	53	.....	43	156	1	3	13	17
1901	57	2,548	29	413	13	70	1	31	142	1	4	13	18

3. Literary and Scientific Institutions

These Institutions are doing good work. (See Superintendent's Report). They have good Libraries of works relating to Arts and Sciences, History, etc., and several of these Institutions have Museums which are frequently thrown open Free to the public. They give popular lectures on Science and Art, History, Literature, etc., and publish their Annual Transactions. Their chief aim is to encourage higher education among the masses, and the amount of patronage they receive is a proof that their efforts are appreciated.

GENERAL REMARKS.

I. The Regulations.

The consolidation of the School Law during the last session of the Legislature, rendered necessary the consolidation of the Regulations of the Department. This has been in accordance with the practice followed every five years. Copies have been distributed among the High and Public School Boards of the Province. With the exception of a few verbal changes, the Regulations of 1901 will be found the same as those of 1896, modified by the provisions of circular 50 of 1899. The courses of study for the examinations which had been announced for 1901 and 1902 are, therefore, continued without any modifications. It may be assumed that educational progress will call for further amendments, but whatever changes experience will suggest should be made, I think, only after very careful consideration and not without giving all parties concerned due notice.

It is notable and encouraging to find the very large amount of attention that is given to our schools, and the books pertaining to the science of education have become very extensive within the last quarter of a century. No less encouraging are the numerous educational gatherings that are being constantly held. There is not a city or town in the Province where people have not frequently assembled, of late years to listen to public speakers who give expression to their views on educational problems. People have become so interested in school questions, that the discussion of our educational system at a public meeting is almost sure to secure the presence of a large number of interested citizens; and it is hopeful to find young people, especially, taking an interest in topics that affect so widely the national weal. Our leading dailies, weeklies, and monthlies constantly have

contributions on educational topics; and the most thoughtful writers in the Province find readily a reading public for good educational articles.

It would be a misfortune if educational affairs were viewed with indifference, and, therefore, should there be fair criticism of our educational system, every true friend of education should rejoice. The subject of education is not one that has advanced in every respect, at least beyond the experimental stage. In no civilized country is there unanimity regarding matters of school administration, school management, or programmes of study. Among the most advanced nations educationists are simply searchers after truth; and criticism, if it is fair, and perhaps when it is unfair, may not be productive of injurious results In England, in the United States, in Germany and other countries, education is a pregnant subject of discussion. Indeed the success of democratic institutions cannot be assured unless it holds a front place among topics of public interest.

The condition of education in Ontario is not the work of any one man, or of any body of men. Our school system is a development for which credit must be given, doubtless in varied measures, to the body of teachers and other educationists of Ontario. An examination of its salient features would call to mind many incidents of historical interest, and would suggest the names of persons who have left their imprint upon elementary, secondary and higher education. If credit is due to many teachers and inspectors for the good features of our system, it is likewise true that responsibility for the defects must be distributed among many persons.

Already many valuable suggestions have been made by inspectors and teachers for amending the present law and regulations. Several important resolutions have also been passed by the Provincial Educational Association and different County Institutes. These recommendations will receive the careful consideration of the Inspectors and other officers of the Education Department. I hope before long to bring to the attention of the profession, the modifications of the present regulations, which it is deemed desirable to make. I think, however, that no amendments of a revolutionary character are needed, and that when the few necessary changes are decided upon, sufficient time should be given before they are to come into force. The provisions for the training of teachers the courses of study in High and Public Schools, and the authorization of text books will always be important matters for consideration. Education must continue to be subject to public control. There may be differences of opinion as to whether this public control should be by the Province or by the locality. How far there should be centralization is a question which cannot be fully settled at once. In the early conditions of a country there are many things which must be left to a central authority, which at a later period may be relegated to the localities concerned. It is just possible that in Ontario decentralization in some directions would be an advantage. In this connection it would not be amiss to notice the following Declaration of Principles of the National Educational Association of the United States:

"We reiterate the statement that the Public School should be the centre of the educational life of the community in which it is located. Especially should this be true in rural districts. Here should be found the public library for the use of all; here the educational extension courses should draw the old and the young; here may literary and social meetings be held which will tend to uplift the mental, social, and spiritual life of the people. Freed from the ravenous influence of partisan politics, untouched by the narrowness of rigid sectarianism, the public school should become the real centre of the broader intellectual life, the educator of men and women beyond the school age, as well as the guide of childhood and youth.

The subjects that may properly be taught in elementary schools include those that bear upon the ethical, physical,, and aesthetic nature of the child as well as its purely intellectual nature. Sober, industrious, intelligent, honest, cultured citizenship should be the result of public school training in the United States.

Our system of education will not be wholly free until every grade of school, from the kindergarten to and including the university, shall be open to every boy and girl of our country.

A public school system of a State should be a unit from the kindergarten to and including the university, and all private institutions should endeavour to work in harmony with the ideals of public education so far as their special purpose will permit them. In order that public and private institutions of learning may more fully co operate in

the general work of education, the relations between these institutions should be more clearly defined than it is at the present time.

Legislation with respect to public education must not wait for public sentiment. It should lead public sentiment when necessary. Experience teaches that what people are compelled by law to do with respect to schools, they readily learn to do without compulsion, but that they usually are slow to demand reforms which involve increased taxation. School legislation should therefore be under the general direction of educational experts.

The National Educational Association watches with deep interest the solution of the problem of consolidating rural schools and transporting pupils at public expense, now attempted in many of our leading States. We believe that this movement will lead to the establishment of township and county high schools, and thus bring more advanced education to rural communities. We also believe that supplementary State support of rural high schools is in the highest interest of the entire State.

The State should support and control institutions whose object is the preparation of teachers for the public schools. Normal schools free to persons preparing to teach are an absolute necessity in a perfected system of education.

No one should be placed in charge of a school who has not been previously trained for the work of teaching. The plan of issuing teachers' certificates of low grades year after year is at best a makeshift, and should be discontinued whenever the State is sufficiently advanced in education to warrant its discontinuance. There should be a limit to the length of time a person can serve as an apprentice in the vocation of teaching.

We believe that the standards for school architecture including the proper seating, heating, lighting, ventilation, and ornamentation of school buildings, should be as definite as the standards for teaching. The law should fix the dimensions and all other requirements of school buildings, as well as the size and character of school grounds."

II Courses of Study.

The courses of study for our schools necessarily present difficulties which are the result of modern developments Good teaching always aims to secure the imparting of knowledge, as well as the acquisition of power. If one kind of information were as valuable as another, the solution of the problem would be largely accomplished. It is a fact, however, that new departments of knowledge have been pressing for recognition. The causes are mainly the development of natural science and the growth of democracy. The latter condition has necessitated the diffusion of knowledge among the masses, which had much less importance when privileged classes held sway. Subjects pertaining to sociology or citizenship demand an amount of attention which was not thought of one hundred years ago. If we are to have permanency for our institutions, the citizens generally must receive such an education as will prepare them for their responsibilities. Modern conditions have also given rise to much specialization even in industrial pursuits; and with the growth of natural science and the necessity of cultivating reading habits among the people, it must be admitted the school programmes of to-day should differ in many respects from those of the schools in the beginning of the last century. Respecting fundamental requirements in school education, the words of the new President of Yale University are very pertinent. After referring to the value of the three Rs, which are mainly the keys of knowledge and instrumental in the production of power, Dr. A. T. Hadley states as follows:

"Within the last fifty years there has been a reaction Our discoveries in the world of nature have been so important that they have secured increasing recognition of their results in school courses. This widened study of modern science has been attended by an increased attention to modern literature also. The pupils have been given the opportunity to know things which were worth knowing, and to read things which were worth reading. This movement has resulted not only in the addition of new subjects of study, but in a radical change of method of teaching the old ones. Arithmetic or geography, as now handled, is a very different thing from what it was fifty years ago. It is full of illustration adapted to the needs and interests of each child. It is rendered pleasant and easy instead of hard. These tendencies have made themselves felt alike in the colleges and the high schools, the grammar schools and the kindergartens. In place of a curriculum designed

for mental discipline, through which all were compelled to pass, we have an educational system intended to give knowledge and the enjoyment connected with the acquirement of knowledge; taking account of the various tastes of children in the successive stages of their progress, and branching, at a comparatively early date, into an elective system, whereby each student can choose those subjects which he most needs or appreciates."

Much of the difficulty in prescribing courses of study for our schools is due to the fact that those who will ultimately follow different pursuits, must necessarily be educated together. Only a comparatively small proportion of pupils ever complete the High School course, and the percentage entering the professions may always be expected to be low. It is also true that the calling in life which a boy will follow cannot, as a rule, be early determined. The great body of pupils may be expected to turn their attention to industrial pursuits. Under these circumstances, the programme for our Public Schools, and even for our High Schools, is intended to give prominence to the subjects which are of most importance to those engaged in the ordinary callings of life. It is, however, also a province of our High Schools to prepare students for matriculation and for the professions; and it is in this direction that the problem presents the greatest difficulty. It is doubtless desirable that a student who will enter college should take up certain subjects at an early age, which the great body of students may omit. There is, therefore, some clashing of interests, which may to some extent, at least, be lessened by judicious school organization. Respecting this part of the problem, Dr. Hadley's words are also well worth quoting.

"It is quite possible that the teachers in our colleges are wrong in laying too much stress on the preparatory side of the high school course; for the majority of pupils in high schools do not and cannot enter college. It is in like manner possible that the high school teachers are wrong in insisting that the grammar school studies should be arranged with a view toward preparation for high school needs; for only a part of our grammar school pupils can ever hope to attend the high school. But it is quite certainly an error to go to the opposite extreme; to say that the grammar school course must be so arranged as to give the maximum development and enjoyment to the grammar school pupil, and that the high schools must arrange to fit their work upon it; or to say that the high school course must be adapted to the general needs of high school pupils alone, and that the colleges must take as a preparation for their students the thing which proves best for those who are not going to be their students. We may as well recognize the fact that there is a real conflict of interest in each grade, between the pupils who are not going any further and those who are. If a pupil, whether in the grammar school or the high school, is near the end of his course of study, he doubtless needs to get a good deal of descriptive science at that point; because if he does not get it then, he probably never will get it at all, and in this age of the world no one can be called educated who has not some general knowledge of science."

In an address delivered before the British Science Association, the Right Hon. Sir John E. Gorst, F.R.S., gives expression to the following views:

"There must be different courses of study for those whose education is to terminate at sixteen, at eighteen, and at twenty-two or twenty-three. Within each of these divisions also, there would be at least two types of instruction, mainly according as the student devoted himself chiefly to literature and language, or to mathematics and science. But a general characteristic of all secondary schools is that their express aim is much more individual than that of the primary school; it is to develop the potential capacity of each individual scholar to the highest point, rather than to give, as does the elementary school, much the same modicum to all. For these reasons it is essential to have small classes, a highly educated staff and methods of instruction very different from those of the primary school. In the formation of character the old secondary schools of Great Britain have held their own with any in the world. In the rapid development of new secondary schools in our cities it is most desirable that this great tradition of British public school life should be introduced and maintained."

"Educators throughout the country are beginning to realize that the traditional High School course is too narrow. This is the result of the slavish subjection to the standards set up by the colleges which have practically constructed the existing curricula. The High School is not in existence simply to supply students for the colleges. The taxpayer is awaking to the fact that his money is not turned to its rightful uses by sacrificing it to the college Moloch. One feasible plan would be for the colleges to do away with the

present specific requirements, and instead insist upon certain essentials which could be made uniform throughout the country. The necessary requirement for college entrance should be not so much a certain number of pages of Latin read or problems solved as ability to do genuine college work."—*New York School Journal.*

"Our university or college or high school friend, interested in education, enthusiastic in his specialty, would have us introduce, or has already introduced, into our schools such work as he carries on with his students, with very little modification or adaptation to children. The botanist would have our little folks begin with the plant cell as the unit of plant life and structure, or with the lower forms of plants, such as pond scum, and work up step by step to the complex organism which the child calls a bean plant. This seems to the botanist the simplest, easiest and only logical method of procedure. The mineralogist would have the children begin with the chemical elements of which minerals are composed, and build up the minerals and rocks, because to him a mineral means nothing unless he knows its components. Both overlook the fact that what is logical and simple for them may be illogical and incomprehensible to the child, and what is complex for them may be simple to the child. Both forget the long process of education, much of it unconscious, by which they learned to analyze the common things about them, before they could even understand that they were complex, much less resolve them into their components. The teachers of college and high school students, discouraged by their lack of power to do careful work, and appreciating the need of a better training in exact, thorough, scientific methods of study, may do, as did the writer, insist on the most careful, exact, detailed work, even in the primary grades, either not realizing, or forgetting, that the children's minds and hands and eyes are not fitted by nature for such work. This is science, but it is not elementary; it is not adapted in material and methods to the nature and needs of the children."—*Extract from "Nature Study" by Charles B. Scott, A M.*

Mr. James P. Munroe, Boston, writes as follows:

"The High School wrongs the public when it gives its best effort to college preparation. The tendency of the secondary school is to leave the boy who does not fit for college indefinitely and unhappily suspended between the earth of the elementary school, which he has come to despise, and the heaven of the university, which he is taught to aspire unto in vain. The high school ought to be an expansion of the grammar school course; instead of that, it is contracted for entrance to the college gateway. The college ought to meet the needs of the high school, instead of making the high school meet the needs of the candidate for freshmen opportunities. The high school should be absolutely independent of the college curriculum and entrance examination.

First, let the secondary school have freedom and breadth, then let the college adapt itself to the secondary school.

The curriculum of the secondary school should include subjects of general interest only. The free high schools have been a party to a great wrong by adapting their courses almost exclusively to preparation for classical colleges. The first step for public secondary education is to secure and assert absolute independence of the colleges. Freedom and breadth once secured, the colleges will adapt themselves to the new arrangement. Exclude from the secondary school all that is professional in tone or favors one class or occupation to the injury of others."

"Beyond controversy, this is a 'government of the people, by the people, for the people'; but at times there seems to be some misapprehension of the application of the term 'people.' The editorial 'we' is more potent and less offensive than the capital 'I,' and the enthusiastic advocate of some change in the course that in imagination is going to revolutionize education, making the crooked places straight and the rough places smooth, exalting the valleys and laying low the hills, with his ear to the ground and his eyes uplifted to get a glimpse of his own prospective greatness, thinks he catches the accents of the people loudly clamoring for the device that is to pave a royal road to learning with the smooth blocks of desire set in undeveloped interest. Pupils do not know enough about themselves or the studies that constitute the curriculum of a high school to decide which studies they should take to develop their individual and peculiar genius, or to suit their ultimate but as yet undiscovered purpose in life, or even to awaken and hold their interest. Choice without power to discriminate is not choice, but caprice, unbridled fancy, unreasoning folly, distasteful even to children. Parents are full of

sympathy for their children, as they should be; they have plans of their own, more or less in harmony with the unformed taste of the children; but, happily, with few exceptions, they defer to the calmer, unbiased judgment of the one whose business it is to know all that can be learned about the functions of different studies, and whose experience is many times as broad as that of any individual otherwise employed. This, I am well aware, throws a great responsibility upon the principal of the high school; but a public office is a public trust, and emoluments and burdens, opportunities and obligations, have a fixed relation to each other.

Even if it were desirable that each individual should choose his own studies and arrange a special course, there are inherent difficulties to prevent such freedom of action. Expense will always fix a minimum for the number to constitute a class; the natural sequence of studies is in many cases perfectly evident and unalterable; a certain intellectual maturity is indispensable to the prosecution of some studies; there is a physical limit to the work that each pupil can do; there are not an indefinite number of hours for the arrangement of a programme of studies: there are still college requirements to be met by those who are not entirely self-sufficient."—Election in High School Courses by the President of St Louis High School.

"In my opinion, however, the chief objection to the multiplication of the number of subjects from which pupils in our high schools may elect a course of study inheres not so much in the intellectual immaturity of the scholar—the first of the factors I have above quoted—as in the second of those factors, namely, the single and only legitimate aim of all public school education in the country; for I understand that in this discussion we are rigidly confined to the schools that are maintained by public taxation. That single and only legitimate aim is intelligent American citizenship. Unquestionably this is in very many cases not apprehended as the raison d'etre of every high school as well as of every elementary school, and, where it is apprehended at all, it is not consistently treated as the chief aim of public school education. It is not to be wondered at that those who advocate a gradual increase of the number of electives as compared with required subjects in the course of study for high schools seem to consider the purpose of the school to be to shift the finished product of the grammar school, to the end that the few score of boys and girls who have really fixed upon some calling or profession in which to do their life's work may be segregated from the hundreds—the very large majority in every high school—who are simply there because their parents send them, and very often with no better reason for such sending than that it is 'the thing to do'.

But if it be true that intelligent American citizenship, and that only, is the reason for levying taxes for educational purposes (and I do not think that that definition can be safely expanded one iota), then so to consider the work of the high school is to substitute for liberal education, that in which alone all the people can share, professional education, which must always be for the select few. However valuable the doctrine of manifest destiny may be as an indorsement of political and territorial expansion, it is fraught with dangerous possibility when it finds a place among the motives directing the public instruction of the youth of this country."—A. H. Nelson, Chicago.

III. Travelling Libraries.

The year 1901 marks a further development in the provisions made by the Legislature for improving the reading habits of the community. The establishment of Mechanics' Institutes in the early history of the country, and the subsquent organization of Public Libraries have secured very great advantages to the cities, towns and villages of the Province. In the new and sparsely settled districts of northern Ontario, the institution of Travelling Libraries will meet, in a very desirable way, the needs of certain classes of our population. Travelling Libraries have proved of very great value in many States of the American Union, and similar results may be expected to accrue from such libraries in our own Province. It is exceedingly desirable that those who are engaged in mining and lumbering operations should be furnished with some means of having their spare time occupied with what will be entertaining and elevating. Below are given the Regulations and form of application for the establishment of Travelling Libraries in Ontario. Already sets of books (50 in each) have been sent to the following centres from the Education Department:—Michipicoten Harbour, French River, Gertrude Mine,

Victoria Mines, Cache Bay, Cartier, Seguin Falls, Carnarvon, and several additional applications have been received. As will be seen from the catalogues below, the works have been very carefully selected and the purposes intended are very well assured.

REGULATIONS.

1. On satisfactory guarantee that all regulations will be complied with, Travelling Libraries may be lent to Associations, or Reading Clubs in the new and sparsely settled portions of the Province.

2 One or more citizens acting as Trustee or Trustees must be personally responsible for the loss or injury beyond reasonable wear ; and the Trustee or Association shall appoint a suitable person to be Librarian.

3. Books (only one case at a time) will be loaned without charge to the Association, excepting the express charges to and from the Department, and the payment of damages for loss or injury to books beyond reasonable wear.

4. The Travelling Library shall not be kept longer than six months after its reception, except by special permission from the Minister of Education.

5. The Librarian shall care for the books while under his control, circulate them in accordance with the Regulations of the Department and the Rules of the Association, and make required reports respecting their use.

6. The books will be carefully selected for each Travelling Library, but the Department will not undertake to furnish other books than those forming each library collection.

7. So far as possible the works of standard authors will be selected, including books of natural and social science, biography, history and travel, in addition to a moderate proportion of works of fiction.

8. The Library shall be kept at a convenient place, and be open for obtaining and returning books at such times as the Association or Trustee in charge shall direct.

9. The Association may require each borrower to pay promptly any fines due for over-detention of books, or for injuries of any kind beyond reasonable wear to any book charged to him.

10. All corrections of the text, or marks of any kind on books belonging to the Travelling Library are unconditionally forbidden, and all losses or injuries beyond reasonable wear must be promptly adjusted to the satisfaction of the Trustee by the person to whom the book is charged.

APPLICATION.

.....Ont..... 190....

To the Minister of Education, Toronto.

The undersigned citizens of ....., Ont , hereby petition the Minister of Education for books for a Travelling Library, to be loaned to..... ....subject to the rules governing such loans.

It is hereby expressly agreed by and between the parties hereto and each of them severally that the books and cases loaned by the Minister of Education in response to this application shall be carefully handled, shall be loaned without cost to borrowers or without other cost than a nominal fee to defray expenses, and that the same shall be returned to the Education Department within a period of six months, unless permission for a longer retention of the same shall be asked and given, and that the books and cases shall be returned in as good condition as when borrowed, ordinary wear excepted, and the said citizens also agree to pay transportation charges both ways, and to pay promptly to the Education Department for all damages to books or cases not occasioned by ordinary wear and use.

....is hereby designated as Librarian, and is authorized and directed to represent us in all correspondence and dealings with the Minister of Education, until we duly give notice of a change in local librarian.

Signatures.	Addresses.
....	....
....	.....

The following is a list of the Books sent :—

Case A.—Abraham Lincoln, (Leland); Alice in Wonderland, (Carroll); Alice of Old Vincennes, (Thompson); Bird Studies with a Camera, (Chapman); Black Beauty, (Sewell); Cardinal's Snuff Box, (Harland); The Choir Invisible, (Allen); Clive, (Wilson); Coligny, (Besant); Dundonald, (Fortescue); Eben Holden, (Bacheller); Eleanor, (Ward); Frederick the Great, (Brackenburg); The Gospel of Wealth, (Carnegie); The Great Boer War, (Doyle); The Grey Fairy Book, (Lang); Haroun Al Raschid, (Palmer); In the Palace of the King, (Crawford); The Influence of Christ in Modern Life, (Hillis); Jack of all Trades, (Beard); Joan of Arc, (Tuckey); Judas Maccabaeus, (Conder); Life of Lord Nelson, (Southey); The Man that corrupted Hadleyburg, (Mark Twain); Marie Antoinette, (Tytler); The Mississippi Valley in the Civil War, (Fiske); Monopolies and Trusts, (Eby); My Winter Garden, (Thompson); The Natural Law in Spiritual World (Drummond); Nelson, (Laughton); Nineteenth Century Science, (Williams); Our Native Trees, (Keeler); The Redemption of David Corson, (Goss); The Reign of Law, (Allen); Richard Yea and Nay, (Hewlett); Rodney, (Hannay); Sailing Alone around the World, (Slocum); Sir Charles Napier, (Butler); Sir John Franklin, (Beesly); Sir Richard Whittington, (Besant); Squirrels and other Fur Bearers, (Burrows); To Have and to Hold, (Johnston); Tom Brown at Oxford, (Hughes); Tommy and Grizel, (Barrie); The Transit of Civilization, (Eggleston); Unleavened Bread, (Grant); Victor Emanuel, (Dickey); The Voice of the People, (Glasgow); Wolfe, (Bradley); The World of the Great Forest, (Du Chaillu).

Case B.—Across the Sub-Artics of Canada, (Tyrrell); Agriculture, (James); The Birds of Ontario, (McIlwraith); Poetical Works, (Burns); Century Book of the American Colonies (Brooks); The Cloister and the Hearth, (Reade); Early Trading Companies of New France (Biggar), Elizabeth and her German Garden; Farthest North, 2 volumes, (Nansen); The Four Georges, 2 volumes, (McCarthy); The French Revolution, 2 volumes, (Carlyle); Frontenac and New France, (Parkman); A Gentleman of France,

(Weyman); The Habitant, (Drummond); History of the English People, 4 volumes, (Green); History of our own Times, 2 volumes, (McCarthy); Ivanhoe, (Scott); The Land and the Book, (Thomson); La Salle, and the Discovery of the Great West, (Parkman); The Life of Christ (Farrar); Lorna Doone, (Blackmore); Monsieur Beaucaire, (Tarkington); Moore's Poetical Works, (Moore); Mr. Dooley's Philosophy; Natural History, (Wood); The Pathfinder, (Cooper); Pickwick Papers, (Dickens); Pierre and his People, (Parker); Pioneers of France, (Parkman); The Prairie, (Cooper); Self-Help, (Smiles); Silas Marner, (Eliot); Shakespeare's Poetical Works, (Shakespeare); Soldiers Three, (Kipling); Soldiering in Canada, (Denison); Sport in War, (Baden-Powell); Strenuous Life, (Roosevelt); Tennyson's Poetical Works, (Tennyson); Tom Cringle's Log, (Scott); Treasure Island, (Stevenson); Wake-Robin, (Burroughs); Westward Ho, (Kingsley); A Woman Tenderfoot, (Seton-Thompson).

Case C.—Across the Sub-Arctics of Canada. (Tyrell); Agriculture, (James); Among the Celestials, (Younghusband); Appreciations and Addresses, (Rosebery); Bird Life, (Chapman); A Book for all Readers, (Stofford); Canadian Essays, (O'Hagan); Oliver Cromwell, (Frith); David Copperfield, (Dickens); Domestic Science, (Hoodless); Early Trading Companies of New France, (Biggar); Elizabeth and Her German Garden; English Traits, (Emerson); Farthest North, 2 volumes, (Nansen); Fights for the Flag, (Fitchett); Flame, Electricity, and the Camera, (Iles); Forty-one Years in India, (Lord Roberts); The French Revolution, 2 volumes, (Carlyle); The Great Boer War, (Doyle); A Guide to Wild Flowers, (Lounsberry); Heart of Midlothian, (Scott); Highways and Byways in Donegal and Antrim, (Gwynn); History of Canada, (Roberts); History of the Hudson Bay Co., (Bryce); Historical Tales from Shakespeare, (Quiller-Couch); Household Economics (Campbell); In India, (Steevens); Last Days of Pompeii, (Lytton); The Life of William Shakespeare, (Lee); The Life and Character of Robert Shields, (Grote); The Life and Works of Sir John Thompson, (Hopkins); The Long White Cloud, (Reeves); Modern France, (Lebon); Old Red Sandstone, (Miller); The Progress of the Century, (Wallace), Queen Victoria, 1819-1901, (Holmes); Religious Progress in the 19th Century, (Withrow); Revolutionary and Napoleonic Era, (Rose); Rise of the Dutch Republic, 2 volumes, (Motley); Short History of the English People, (Green); Silas Marner, (Eliot); Soldiering in Canada, (Denison); A Story of the Cowboy, (Hough); A Treasury of Canadian Verse, (Rand); The United States of America, (Channing); West African Studies, (Kingsley); Wild Animals I Have Known, (Seton Thompson).

Case D.—Astronomy, 19th Century, (Clerke); Ben-Hur, (Wallace); Bob, Son of Battle, (Ollivant); Centennial of Canadian Methodism; Charles O'Malley, (Lever); Country Life in Canada 50 Years Ago, (Haight); Creator and Creature, (Faber); The Cruise of the Midge, (Scott); Colin Campbell, (Forbes); Dampier, (Russell); Lord Lawrence, (Temple); Strafford, (Traill); Wellington, (Hooper); Cardinal Wolsley, (Creighton); Oliver Cromwell, (Harriston); Pitt, (Lord Rosebery); Queen Elizabeth, (Beesly); The Expansion of England, (Seeley); Five years of My Life, (Dreyfus); Fifteen Decisive Battles, (Creasy); The Great Lone Land, (Butler); History of Canada, 1505-1689, (Tout); History of England, 2 volumes, (Macaulay); History of the 10th Royal Grenadiers, (Champion); History of the United States, (Channing); Life and Times of Sir Isaac Brock, (Read); Life and Times of Governor Simcoe, (Read); Life of George Stephenson, (Smiles); Life of Sir Walter Scott, 2 Volumes, (Lockhart); Legends and Tales of the Hartz Mountains; The Makers of Venice, (Oliphant); Old Red Sandstone, (Miller); Our Native Trees, (Keeler); Nicholas Nickleby, 2 volumes, (Dickens); The Earl of Aberdeen, (Gordon); The Earl of Beaconsfield, (Froude); The Earl of Derby, (Saintsbury); Viscount Palmerston, (Marquis of Lorne); Robbery Under Arms, (Boldervood); The Six-Nation Indians, (Mackenzie); The Sowers, (Merriman); Stanley and the Congo, (Stanley); Tennyson's Poetical Works, (Tennyson); Walden, (Thoreau).

Case E.—Abraham Lincoln, (Leland); The Animal World, (Vincent); The Plant World, (Vincent); The Family of the Sun, (Holden); Stories of Great Astronomers, (Holden); The British Navy, (Stenzel); The Cloister and the Hearth, (Reade); Chamber's Miscellany, 4 volumes; David Copperfield, (Dickens); Havelock, (Forbes); Rodney, (Hannay); Warwick, (Oman); Frederic the Great, (Brackenbury); Henry Esmond, etc., (Thackeray); Haroun Al Raschid, (Palmer); The Lovers of the Woods, (Boardman); Macaulay's Essays, 3 volumes, (Macaulay); Montcalm and Wolfe, 2 volumes, (Parkman); The Natural Law in the Spiritual World, (Drummond); Old Red Sandstone, (Miller); Progress of Invention, 19th Century, (Byrn); Gladstone, (Russell); Lord Melbourne, (Dunckley); Perveril of the Peak, (Scott); Uncle Tom's Cabin, (Stowe); Vanity Fair, etc., (Thackeray); Venetian Life, (Howell); Westward Ho, (Kingsley), Wilson's Tales of the Borders, (4 volumes). Andersen—Contes Danois—(Yan' Dargent); Adventures De F. Cortes, (Lebrun); Cinq Histoires, (Meras); Choix De Contes Contemporains, (O'Connor); La Fountaine—Choix De Fables, (Thirion); Le Roman D'un Jeune Homme Pauvre, (Feuillet); Merimee Colomba, (Cameron); Paul et Virginie, (Kuhus); Silvio Pellico, (Woillez); Recits D'un Alsacien, (Dubois); Sous La Neige, (Porchat); Travers Le Zanguebar, (Le Roy).

Case F.—About the Weather, (Harrington); Curious Homes and Their Tenants, (Beard); In Brook and Bayou, (Bayliss); The Story of the Fishes, (Baskett); Agriculture, (James); Black Beauty, (Sewell); The Choir Invisible, (Allen); Canadian Essays, (O'Hagan); Chambers' Miscellany, 4 volumes; David Copperfield, 2 volumes, (Dickens); Pickwick Papers, 2 volumes, (Dickens); Clive, (Wilson); Nelson, (Laughton); Napier, (Butler); Wolfe, (Bradley); Cardinal Wolsley, (Creighton); Henry VII, (Gairdner); Queen Elizabeth, (Beesly); William III. (Traill); The Great Boer War, (Doyle); History of England, 5 volumes, (Macaulay); History of the North West, 3 volumes, (Begg); A Kentucky Cardinal, (Allen); Conspiracy of Pontiac, 2 volumes, (Parkman); A Half Century of Conflict, 2 volumes, (Parkman); Judas Maccabaeus, (Condor); Marie Antoinette, (Tyler); Sir John Franklin, (Beesly); Sir Richard Whittington, (Besant); The Newcombes, (Thackeray); Pendennis, (Thackeray); Roundabout Papers, (Thackeray); The Virginians, (Thackeray); Wilson's Tales of the Borders, 4 Volumes.

Case G.—The Hall of Shells, (Hardy); Stories from Arabian Nights, (Singleton); The Story of the Birds, (Baskett); Story of Rob Roy, (Scott); Agriculture, (James); Auld Lang Syne, (Muller); Black Beauty, (Sewell); Canadian Essays, (O'Hagan); Cardinal's Snuff Box, (Harland); Chambers' Miscellany, 2 volumes; David Copperfield, (Dickens); Domestic Science, (Hoodless); Eleanor, (Ward); Emerson's Essays, (Emerson); English Wayfaring Life, 14th Century, (Jusserand); Dundonald (Fortesque); Montrose, (Morris); Rodney, (Hanning); Warren Hastings, (Lyall); Edward I., (Tout); Henry II., (Green); Peel, (Thrusfield); William the Conquerer, (Freeman); Famous Men and great events, 19th Century, (Morris); Felix Holt, (Eliot); Fifteen Decisive Battles, (Creasy); Forage Crops, (Shaw); Ivanhoe, (Scott); Laura Doone, (Blackmore); Lords of the North, (Laut); Modern Painters, 2 volumes, (Ruskin); History of the North West, 3 volumes, (Begg); Old Creole Days, (Cable); The Old Red Sandstone, (Miller); The Oregon Trail, (Parkman); Pioneers of France, (Parkman); Paul Kruger, (Statham); Secrets of the Woods, (Long); The Story of Creation, (Clodd); Christmas Books, etc., (Thackeray); Paris Sketch Book, (Thackeray); Walden, (Thoreau); Wilson's Tales of the Borders, 4 volumes.

Case H.—The Beauties of Nature, (Lubbock); By England's Aid, (Henty); Canadian Essays, (O'Hagan); Captain Cook, (Besant); Charles XII. of Sweden, (Browning); Clive, (Wilson); Colin Campbell, (Forbes); Constitutional History of England, (Hallam); Curiosities of Bird Life, (Dixon); Bleak House, 2 volumes, (Dickens); Child's History of England, (Dickens); Christmas Books, 2 volumes, (Dickens); Little Dorrit, 2 volumes, (Dickens); Miscellaneous, American Notes, (Dickens); Old Curiosity Shop, 2 volumes, (Dickens); Oliver Twist, (Dickens); Our Mutual Friend, 2 volumes, (Dickens); Sketches By Boz, (Dickens); The great Boer War, (Doyle); Harold's Explorations, (Troeger); The Insect World, (Weed); John Halifax, Gentleman, (Mulock); Napoleon, (O'Connor); Outline of the Earth's History, (Shaler); Oliver Cromwell, (Harrison); Our Favourite Song Birds (Dixon); Pictures from the Life of Nelson, (Russell); Pitt, (Lord Rosebery); The Story of our Planet, (Bonney); Adventures of Philip, etc., (Thackeray); Burlesques, (Thackeray); Christmas Books, etc, (Thackeray); Henry Esmond, etc., (Thackeray); The Newcombes, (Thackeray); Paris Sketch Book, (Thackeray); Pendennis, (Thackeray); Roundabout Papers, etc., (Thackeray); Vanity Fair, etc., (Thackeray); The Virginians, (Thackeray); Travel and Talk, 2 volumes, (Haweis), Uncle Tom's Cabin, (Stowe); Walpole, (Morley); Wellington, (Cooper); Wilkes, Sheridan, Fox, (Rae).

IV.—School Libraries.

In my report of last year I urged upon trustees the desirability of having school libraries established. Some progress in this direction has already been made and much credit is due Public School Inspectors, who have drawn the attention of school boards and ratepayers to the importance of the question. Many teachers have enlisted the sympathy of parents and children in the matter, and in many a rural school the nucleus of a library has already been started. It will be gratifying should increased liberality result in a rapid increase of libraries for rural schools. The books selected should be carefully chosen, and the needs of the pupils should have first consideration. Perhaps in no matter connected with school instruction is the guidance of the teacher more urgently needed. Unless books are carefully selected, there is danger that the use of fiction, and that not of a very high order, will predominate. Unless the rural schools are supplied with valuable books there is lacking a valuable opportunity for refining the taste and enlarging the knowledge of the children. It cannot be repeated too often that one of the main purposes of the school is to awaken the love of reading, and thus give children the means of furthering their education after they turn to the active duties of life. Regarding "the relation of the school to libraries," the following extracts from an article by Dr. Charles A. McMurray, and published in the report of the Commissioner of Education for the United States, will pay a careful perusal:

"The centre around which cluster all the problems which relate to the reading habits of children is the public school. The family, in many cases, is doing more than the school, to be sure, but it is the school, after all, in the great average of cases, which must give the children a taste for books and an introduction to their proper use. It is only in exceptional cases that parents have knowledge and the means to supply children with suitable books, and, what is more important, with the right guidance and sympathy in making a close acquaintance with them.

We may well inquire, therefore, what the proper function of the school is in teaching the great body of children how to appreciate and use the best books. Within the last few years teachers have begun to realize that this is one of the few great privileges and duties of the school. To teach children how to read, so that they could make use of books, newspapers, etc., was once looked upon as a chief object of school work. We now go far beyond this, and ask that teachers lead the children into the fields of choice reading matter, and cultivate in them such a taste and appreciation for a considerable number of the best books ever written that all their lives will be enriched by what they read. This is one of the grand but simple ideals of the schoolroom, and lends great dignity to every teacher's work in the common schools. The most solid and satisfactory reasons can be given why this should be done in every schoolroom. These substantial materials of culture belong to every child, without exception. They are an indispensable part of that general cultivation which is the birthright of every boy and girl. The child that by the age of 14 has not read Robinson Crusoe, Hiawatha, Pilgrim's Progress, The Stories of Greek Heroes by Kingsley and Hawthorne, The Lays of Ancient Rome, Paul Revere's Ride, Gulliver's Travels, The Arabian Nights, Sleepy Hollow, Rip Van Winkle, The Tales of the White Hills, The Courtship of Miles Standish, Scott's Tales of a Grandfather, Marmion, and Lady of the Lake, the Story of Ulysses and the Trojan War, of Siegfried, William Tell, Alfred and John Smith, of Columbus, Washington, and Lincoln—the boy or girl who has grown up to the age of 14 without a chance to read and thoroughly enjoy

these books has been robbed of a great fundamental right; a right which can never be made good by any subsequent privileges or grants. It is not a question of learning how to read—all children who go to school learn that; it is the vastly greater question of appreciating and enjoying the best things which are worth reading. Judged on this standard of worth, the reading exercises of our schools have acquired a tenfold deeper significance, and all teachers who have looked into the matter have felt a new enthusiasm for the grand opportunities of common school education. There is no doubt, whatever, among intelligent people, that good literature is a powerful instrument of education. It is by no means the whole of education, but when the reading habits of children are properly directed, their interest in suitable books cultivated and strengthened, their characters are strongly tinctured and influenced by what they read. If their minds are thus filled up with such stimulating thought material, and their sympathies and interests awakened and cultivated by such ennobling thoughts, the better side of character has a deep, rich soil into which it may strike its roots. So profound has been the conviction of leading educators upon the value of the reading matter of the schools for the best purposes of true education that the whole plan of study, and the whole method of treatment and discussion, as touching these materials, have been reorganized with a view to putting all children into possession of this great birthright.

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Having insured a proper place and respect for this indispensable nucleus in which reading habits and tastes are to find root and grow strong, we may next enquire into the function of the school in giving children a proper opinion of the value and use of the great body of information books, history stories, geographical readers, travels, biographies, science narratives and descriptions, histories, current magazines, reference books, etc., which contribute so largely to a full equipment for life.

Within the last few years great progress has been made toward supplying the schools with a large quantity and variety of supplementary reading. The lessons in history, geography, and natural science are constantly enlarged and enriched by this sort of reading, to which children are freely referred in studying their lessons. This use of varied material requires greater skill upon the part of teachers, a wider range of information, and the ability to organize and unify these diverse sources of information with the regular lessons. But this kind of study, if carefully planned and skillfully executed, gives the boys and girls better materials of thought, more independence in using books, and a wider range of knowledge. It points directly to the library as a necessary and very efficient agency of popular education.

A small library is becoming indispensable to the teachers and pupils of the grammar school in carrying out the legitimate work of the school. In order to give definiteness to this idea of a small library, suppose it to consist of 500 to 1,000 books, containing the best classic stories, poems, biographies, histories, travels, novels, and books of science suitable for the use of children below the high school. The necessity for such a choice selection of library books is made evident by an examination of the children's present studies in history, geography, and science. History stories are now read in nearly every grade of the common school, to what is now generally known as the eighth grade. But now history stories are regularly used in all the grades, from the third to the eighth, inclusive. In the third, fourth, and fifth grades, or years, of the common school, stories are skillfully narrated by the teacher, discussed, and reproduced by the children. It is possible in this way to give them a very keen and hearty impulse toward biography and history . . .

Now, it is evident that a carefully selected library of the best books of this character should be found in every grammar school. There will be a considerable number of boys and girls in every school who will be well prepared by such school studies as we have just described for a profitable use of these books in private reading. Children in general cannot supply these books. The parents, in most cases, have neither the means nor the judgment for their proper selection. There should be no ambition on the part of teachers to make bookworms of children, and it is certainly advisable to avoid an indiscriminate and loose reading of many books. The teachers should not only give children a careful and appreciative introduction to a few of the best books, but they should also try to advise and assist children in forming profitable habits of reading. In occasional general

exercises before the whole school, and in private talks with the children, many a valuable hint may be given in regard to what books to read and reread, how to study out and appreciate the characters; in short, how to assimilate what they get from books

In geographical studies a change, somewhat similar to that which has taken place in history studies, has been brought about in the last ten years. Instead of the meagre outlines of geographical topics, and in place of the endless map questions and names for memorizing from the third grade on, we have begun to select instructive and interesting topics which are treated with a richness of detail, illustration, and description that awakens the best thought and interest of children.

Much of this work also has to be done in the early grades by the oral presentation of the teacher, and after a year or two of such home geography, by excursion and descriptive geography, by important topics, the children are prepared for making a good use of the geographical readers and books of travel, which have now attained great excellence and value. Here again it is necessary that the school library shall be well equipped with a careful selection of the best recent books.

It need not be feared that this method of study and use of books will lead to a superficial, fragmentary, or unsystematic knowledge, but it will require better class-room instruction on the part of the teachers, and more ability to organize knowledge derived from reference and other library books. Here again, as in history, quite a goodly number of the children may be lead on to excellent habits of voluntary and private study. Perhaps the best proof of the right instruction in the class-room is the tendency of children to extend their knowledge by later voluntary readings in the use of the library.

A short list of books will also indicate how enterprising our best book firms are in supplying what our libraries need in the way of geographical readers, travels, guide books, picturesque narratives, etc.

In the field of natural science there is a third great realm of study which has been lately brought under the direct jurisdiction of the schoolmaster. It is only within the last few years that any considerable number of schoolmasters and schoolmistresses have begun to appreciate what a glorious field of study has been opened to the common school. But books and libraries seem to stand in a different relation to nature study from that already ascribed in history and geography. In this case nature herself is the book to be studied, and no artificial book should come in between the observer and the leaves of nature's own book Nature study, when properly managed in elementary schools, is a direct protest against the wrong use of books. By means of excursions upon the campus, in the fields, gardens and woods; by experiments in physics and chemistry in the laboratory; by watching birds among the trees, insects upon the pond, butterfiies on the clover, trees in their blossoms and fruitage, the weeds by the roadside, vegetables in the garden, the children are acquiring the first indispensable impression and that happy enjoyment of the wonders and beauties surrounding them in nature without which all later study from books and scientific treatises is unreal and unmeaning.

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It will be seen from the preceding discussion that the purpose of the school, in addition to teaching children to read, is to give them a spirited introduction to the chief kinds of reading matter, to develop such tastes and habits of reading and consulting books that they will be disposed in their later years to make the best use of their power to read. The mere ability to read is of very little value; in some cases it is a positive misfortune, when the reading matter is vicious and the taste for such demoralizing books is cultivated. When the children are ready to leave school, their self education will begin in earnest One of the best things that the school can do is to launch people upon their independent life with a taste for good reading matter and a judgment sufficiently developed for selecting the right classes of books. The school library and the public library must furnish the chief opportunities for children in their later school years and during the years which follow school life for carrying out any plans of reading. The teachers and parents and the librarian, as far as possible, should come to an understanding and agreement as to what books they would recommend, and encourage children to read.

It is not uncommon for teachers and principals of schools to call together the parents and explain the character of our reading matter, the selection of proper books for

children, and the advantages of parents reading with their children. There is, probably, no one thing that can accomplish more in making the home what it ought to be than such home readings of books which are recognized by all as among the best. Fortunately, the parents will be benefited as much as the children for the books that we have had in mind are just as interesting and valuable to grown people as to children. They are books that do not lose their charm. Much has already been done in this direction ; but vastly more must be done in the future. The home and the school properly working together can do a great deal in this way in creating a happy and healthful moral atmosphere which is most favorable to the development of strong and symmetrical characters. What has been done, therefore, is only a beginning of what should be done all over this land and for the children of all classes in myriads of homes But to accomplish this, libraries must be numerous and well equipped, far beyond anything which is common among us now. The public library, with its well-stored shelves of choice books, becomes as necessary as a schoolhouse itself. The librarian, trained and cultivated, should know as well as the teachers themselves what books are suitable for school children and young people. Librarians, therefore, should not only be experts in classifying and cataloguing books, but they should be trained experts in estimating and selecting reading matter for educative purposes. Many of the professional librarians have already responded to this requirement, and a great deal has been done in some of our towns and cities, like Boston, Minneapolis, New York City, and smaller cities, to bring the public librarians into vital touch with school children during these years of educative growth and character-building.

A library should furnish a good collection of books in all the principal departments of study. In this way a child in the course of his education may widen out his knowledge and interest in many directions. For the sake of general, all-sided culture it is desirable that a child should be many-sided in his development, and yet a library may produce an excellent effect upon a child by giving him an opportunity for cultivating a strong liking for one limited class of books It is a great and successful stroke of education thoroughly to awaken and interest a child in one branch of study, and to make him acquainted with a few of the masterpieces in this narrow field. This one enthusiasm may be enough to make a reader and student, while a child who has never required a taste for any one class of books will remain dull, and shallow, and commonplace. From this standpoint, a good library, even though it be not very large, may contribute efficiently to the educational growth of a variety of students.

In fact the library can do for the student what no school can do. It can furnish the opportunity for that fuller and richer study in any one branch of science in which the student has become deeply interested. The school of necessity covers all branches of study with about equal or impartial care. It cannot go deeply into any subject The best it can do is to open up the subject and develop a healthy and hearty appetite for that kind of knowledge. But the library can furnish just that broader and select material which can develop a strong and permanent enthusiasm. The school can do little more than awaken an appreciation for a few masterpieces of forensic literature ; but the library should contain all the great speeches of Burke, Fox, Chatham, Cicero, Webster, Sumner, etc , where the boys who have a special taste for this kind of literature can find the best in abundance. The same is true for those who have a taste for history, or art, or the drama, or fiction, or biology. "

V Continuation Classes.

The provisions of the Public Schools Act and the Regulations respecting Continuation Classes have evidently secured important advantages for children in many parts of the Province not provided with High Schools. The grants to those schools for 1901 were $100, $50, $25, and $15 for schools in grades A, B, C, and D respectively. The number of schools in the different grades were A-55, B 51, C-137, D-188 In many of the schools of grade A a second teacher, holding a First Class certificate or a High School teacher's certificate, was engaged during the year. In such cases an additional $100 was apportioned. The County Council is required by statute to pay an equivalent to the School Board, and it is satisfactory to know that payments by municipal councils have been cheerfully made; indeed, in some cases, County Councils have paid grants beyond the minimum required by law.

As I pointed out last year, the larger Continuation Classes, especially those in Grade A, are to all intents and purposes High Schools. In some localities the trustees have

seen the wisdom of employing teachers holding university degrees, as well as certificates from the Normal College. In a few instances three teachers are now engaged, and the amount of work carried on is at least as extensive as that taken up in our smaller High Schools. These Continuation Classes have served to diffuse secondary education among the people of most parts of the Province. Doubtless it will appear an anomaly in having such schools regarded as Public Schools. The anomalous condition mentioned is of course due to certain historic developments, and it may be difficult to secure uniformity even though uniformity should be deemed in this respect desirable. To be more specific, it would appear strange that a school with two teachers engaged in the work of secondary education should be ranked as a "Continuation Class", while a school in a neighboring village with only two teachers doing exactly similar work should be ranked as a High School. It is reasonable to suppose that the former might just as well be organized as a High School under proper conditions. This is a matter, however, that would require legislation, the necessity for which does not appear to be urgent.

The impression that we can have too many High Schools or that too many pupils can aim to obtain secondary education has well lost any force it formerly possessed. To strive in any way to lessen the ambition of farmers' sons, or others, in their efforts to secure a High School education, will not receive favour in any quarter. An American educationist discusses this question in an article, which recently appeared in the Pennsylvania School Journal. His words are not out of place in this connection:

"The public High School is an institution established to supplement the elementary education of all classes, to make the individuals more alert, more progressive, more cultivated, more able to fill positions in the local life or in the state or in the nation, to discharge its duties as a sovereign citizen, or as an executor of the law, or as a judge of the right. Now most of our cities and boroughs have High Schools. What shall we say to the children of the farmer, the children of the miner, or the children of him who does not live in or near the centres of population? Shall we say to them, because they labor on the farm or in the mine, giving employment to three-fourths of the people of this great country, that their children must not enjoy the blessings of higher education? Are we going to widen the gulf between classes by making another division from an educational standpoint? The High School is an essential part of every township as a matter of safety to the Commonwealth, and if the people are not able to support a High School, such as we have in our towns, the state should see to it that they are established.

What will the township High School do for the rural districts? It will not only break down the barrier of class distinction in education, but it will give to the farmer an education which his position demands for its successful performance. While it may not teach the nature of the soil and all about how to cultivate flowers, plants and grains, it will give to the farmer boy a development of mind that will make it possible for him to make his own application. It will give him a broader view of his surroundings and of life in general. It will make him a better farmer and a better citizen. If for no other reason than this the township High School should be established, and established at once. But it will do more than this. It will provide a means by which he can go, if he desires, to any institution of learning in the land. It will give him a chance to enter any professional school from which, under present existing conditions, he is barred. No institution of learning will now suit candidates who have not at least a college or high school education. It will do more than this. It will make the home life of the country more like that of the city. It will make him more contented. The idea has long been exploded that we educate people beyond their sphere. The sphere of the American child to-day is not limited. It is what his virtues, his talents, and his energies can make it. Our country has been privileged to occupy among nations the happy place of a people destined to demonstrate the encouraging and fruitful truth that the born-rulers of mankind are not cradled in king's palaces. When Abraham Lincoln had lived and died, it was demonstrated beyond peradventure that out of the humblest places of the land might come powers which would command the reverent awe of mankind. If this is true in the domain of statesmanship, why is it less true in the domain of intellectual achievement? The idea that an elementary education is sufficient for the farmer is not true, never was true, and never will be true.

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Now, what should be done? If we can prepare our High School graduates at home to become good teachers, what right have we to say to them, "You must go to a training school before you can teach." If we do not prepare them at home, the State will be robbed of some of its best teachers. Many of our graduates who have good health, fine minds and have special ability to teach, coming from homes of good, respectable citizens, and who make first-class teachers, could not enter the teacher's profession—thus becoming more useful to the community and to the State—because they are not able to attend a training school on account of their financial condition. Are we going to say to them, 'You must go to the factory and labor because you are poor,' and to others, 'You can become a teacher because you have money'? No, sir, we should do all we can for those at home, and give all an equal chance. You will find that most of the teachers in our graded schools to-day are High School graduates, and the more we do for them after they have graduatod and before they take their places as teachers, the better will be our elementary schools."

"A careful study of all the conditions involved seems to me to make it very doubtful whether the creation of a new class of high schools is the best way to reach the country pupils. The present tendency everywhere is for these pupils to find their way into the city and village high schools. If their tuition in these schools could be provided at public expense so as to multiply, enlarge, and strengthen such schools, we should have immediately in most States, the best solution of the problem before us.

The village high school needs the larger membership and the increased income from the attendance of rural population. It has been often remarked, too, that country pupils are on the average somewhat more devoted to study than the city pupils, and hence improve the student spirit and esprit de corps of the school. They usually make more sacrifices to attend, come farther or perhaps board away from home, and are generally less distracted by domestic and social interests. We see, therefore, that the high schools gain in income, attendance, and scholarship. All these reasons make it advantageous to the existing schools to furnish instruction for the rural pupils.

It is better also for the rural people to obtain free high-school opportunities at these schools. Convenience is an important consideration. It is as natural for the village or city to be the high-school centre as to be the trade centre of the surrounding country. As a rule the country people want the same kind of high schools as the people of the city. If the experiment is ever tried, it will probably be found that the separate schools of agriculture and housekeeping, established for country people only, will be but slightly patronized by the class for whom they are intended, while the greater number of bright, ambitious, country students will pass by the 'hay seed' schools to seek their training as they do now in the industrial, commercial, and literary courses of the city high schools. They know they are the peers of the city students, and they desire to demonstrate the fact. There is no divergence either of talent or of destiny that requires a separation of rural from city high school students.

I have heard it objected that the country people would under this arrangement have no part in the control and management of the high schools that train their children. I admit the force of the objection. In theory at least it seems at first glance a strong argument against the education of a part of the people in schools controlled by others.

Several points can be made in reply to this objection. First, there is no reason to suppose that the schools would be managed better, or even differently, if the rural population participated, nor is it evident that their interest in such schools would be greater. Again, any well-devised plan will include State regulation and approval of the high schools, in which approval of course the country people will be represented, and by which their interests in secondary education will be better secured than by direct control. And, finally, whatever slight disadvantages remain will be far overbalanced by the advantages already stated."—Extract in the report of the U. S. Commissioner of Education by H. R. Corbett.

VI. High Schools.

The statistical tables show that the High Schools of the Province continue to make substantial progress. The increase in the efficiency of those institutions during the last

fifteen or twenty years is so well known as to pass unnoticed. Doubtless the amendments to the High Schools Act of 1871, and again in 1891, have been the main factors in giving such marked impetus to the progress of secondary education. It may be well to call attention to the fact that previous to the first of these dates, the High Schools, or Grammar Schools as they were then called, received comparatively little financial support from municipalities, and were looked upon as institutions for the few boys who might enter upon professional pursuits. Before 1871 the courses of study were ill adapted to the requirements of the general student, and in most localities the Public Schools and Grammar Schools performed their work side by side, and the latter institutions simply catered to the wealthier classes. By having courses of study, allowing greater freedom, and meeting the needs of the masses of the people, the High Schools have grown in popularity, perhaps not excelled in any other country; and as a consequence, municipal councils have, as a rule, contributed liberally to their support. Not less important towards improving the efficiency of the High Schools has been the adoption of regulations requiring higher qualifications on the part of the teachers. Not only has prominence been given to high university attainments but a thorough course of professional training followed by two or three years' experience, is now exacted before the highest grades of certificates can be awarded. The mode of distributing the Legislative grant has had much to do with the increase of salaries, the erection of handsome buildings, and the equipment, with valuable libraries of reference, apparatus, maps, etc. There is no doubt the regular official visits of the High School Inspectors, their reports to School Boards, and their frequent suggestions to the Education Department, have been important elements in bringing the High Schools and Collegiate Institutes to the exceedingly satisfactory position to which they have already attained.

It would be folly to rest satisfied with the conditions of any part of our educational system. We must remove any recognized defects and be guided to some extent, at least, by the educational trend in other countries, and the problems which modern conditions have forced upon us Already I have referred to the necessity of carefully considering every proposed amendment to the regulations before making any changes. The courses of study will call for some modifications in the interests of the great body of students attending the High Schools. If many students who may be expected to follow the ordinary callings in life are giving attention to subjects mainly prescribed for intending matriculants, a remedy will doubtless have to be provided. It is just possible that some modification of the present requirements for the examinations for Junior Leaving Standing may secure the object in view. The demand for technical education is growing, but it would be unfortunate should the value of manual training or domestic science give rise to erroneous views regarding the value of the ordinary subjects of a High School course. It will doubtless be desirable to prescribe regulations for the distribution of such grants as may be made by the Legislature towards technical education The appropriation for this purpose has created an interest among our High Schools and Collegiate Institutes in manual training and other departments of technical education. Up to the present the method of distributing the appropriation has been tentative. The encouraging results that have followed will justify the adoption of such regulations as will place the financial aid given on a fixed basis. It may also be well to consider if the time has not already arrived when the minimum qualifications for assistant High School teacher should be raised The number of university trained students who are taking up the profession of teaching would show that the time is not distant when every assistant in a High School should be a graduate in Arts of a university.

It has often appeared an anomaly that the educational interests of a town should be under the control of several distinct Boards. In the United States, even in the largest cities, all the schools are managed by one Board of Education. It is evident where there are several Boards—Public School Boards, High School Boards, Technical School Boards and Library Boards—there must of necessity be greater difficulty in securing efficiency and avoiding unnecessary expenditure. A united Board prevents jealousies arising from different interests, does away with over-lapping of courses of study, and gives less difficulty to municipal councils in supporting the various educational interests. It is well to note that in the recent discussions in England there is a vigorous demand for placing elementary, secondary, and technical education under one Board, and a policy like that of the United States in this matter is urged more strongly there than in Canada. In Ontario

union boards, like those found in Hamilton, London, Kingston, Guelph, St. Thomas, etc., have worked well, and the ratepayers would not think of having one Board for High Schools and another Board for Public Schools It is a fact, however, that separate Boards have worked exceedingly well in some parts of the Province, and it is better to give full freedom in the future, as in the past, to localities to settle the matter for themselves.

The demand for free High Schools is increasing In my report of last year I drew attention to the liberality shown by the Americans in having their High Schools (at least in the Northern States) all free. It may be doubted whether we can hold our own in the industrial world if equal liberality is not shown by our citizens. The conditions in this Province, educationally considered, are about the same as in the United States, and it is doubtful if it is wise in any part of the Province to adhere to the policy of requiring fees for admission to our High Schools. The plan of exacting fees is scarcely in harmony with modern views of education, and is certainly not in keeping with the democratic tendencies of our times. It should be known also that the English public is unmistakably moving in the direction of free education. The famous Cockerton decision occasioned during the year intense discussion in nearly all parts of England, and it is doubtful if the people of England will not, before long, give the advantages of secondary education to the masses of the people, as it gave the advantages of elementary education thirty years ago. The friends of the so-called Public Schools of England, and the supporters of Church Schools, will naturally resist the educational demands of the times, but the upholders of free education, who are thoughtful students of history, will have little fear of the result. It is satisfactory to notice that High School Boards in some places in Ontario are abolishing fees for pupils of the First Form. Probably a step of this kind will soon lead to similar action regarding the pupils in other Forms. In any case, it is a matter that may safely be left to the localities concerned, but it is well for the Province generally to recognize the trend of events in connection with this question.

"The masses (in Germany) are debarred by higher authority from participating in the benefits of the secondary schools which they are taxed to support. Even in Germany there is not an entire satisfaction with the arrangement. The later reform movements indicate that the people at least wish to secure some form of instruction common to all the lower classes, which will enable all to pursue a higher course subsequently if pecuniary conditions permit. . . . The European system is distinctly a class system. Only those possessed of at least moderate means can hope to secure the benefits of higher education Newsboys and bootblacks can never hope to rise above their station. The more we can do to strengthen the continuity between primary and secondary schools, the greater will be the strength of our educational system. By extending the benefits of education to all alike, as we are surely doing, we need not be troubled with Germany's hallucinations with a land filled with 'hungry candidates,' the result of over education." —Secondary School System in Germany, by T. E. Bolton.

"It is the age of experts, of specialists; no great undertaking is entered on now by intelligent men without employing a man trained in that particular thing. The function of the high school and of higher education is to train experts. The world is looking for high priced men. You can get 1,000 men to dig dirt or do other manual labour where you can find one competent to take charge of a great enterprise. You can recruit a whole army of privates more easily than you can find competent generals; just as readily buy 1,000 horses for $100 each, while if you want one that is worth $5,000 you will have to search for it. This has proved, not only in America but also in other countries, that it pays to spend these large sums in carrying on education. The principle behind it is a plain one. Probably all believe in it, but let us review the facts. Even those who believe strongly that blood tells, that the educated father and mother are much more likely to have children of unusual promise, must admit with the best students of political economy that the results of statistics and observation prove that, while heredity counts for much, the majority of the boys and girls of unusual gifts and capacity, the men and women of genius that make the success of localities and of nations are born among the laboring classes, because they outnumber the educated classes five to one. That is honest democracy. Whatever our theories and sympathies may be, that is the fact. A man who for lack of opportunity or incentive might have stayed in some little village and lived and died and done his work, but who goes out like Joseph Henry, or Edison, or

anyone of the hundred whose names occur to you at once, is of a value that cannot be measured in mere dollars to the community and to the state."—"The future of the High School," by MELVILLE DEWEY.

"A prevalent view is, that because in times past the 'three R's' constituted all elementary instruction, therefore any education which occupied itself with these would be sufficient. To suppose this, is, however, to close our eyes to the changes which have been wrought in the world, and to lose entirely the significance of such portions of our history as form the most constant theme of our conversation. The increased material prosperity which has sprung from the free development of creative activity has changed the conditions of our life, and with the changed conditions has come a change in the needs of education as well as in all the other institutions of society. Men see that in all true progress in manufacturing, the learned professions, and even theology, we need constant readjustment, but many seem to draw an arbitrary line separating education from these other interests. It must be remembered that as the individuals change, so do they modify all those institutions which are but the expressions of their will. Hence the reasonableness of an objection against any education which, however suitable to times past, is out of relation with times present. Owing to the diffusion of intelligence, and more especially to its application to machinery, skill is now becoming as essential as knowledge was in the times of our fathers. Whether with Cardinal Wiseman we dream of converting the artist into an artisan, or desire with many to secure to our children the ability and desire of earning a living and of contributing to the increase of accumulated wealth, whether this be spiritual or material; or if we take the stand-point of the so-called workingman, and desire a fair day's wages for a fair day's work; or desire to reduce the number of 'clerks' (using the word technically, as it is employed by our discoursers upon political economy); or desire to see each man reach his highest development; in all these cases, and in all others that may be stated, we are called upon to face the fact that times have changed, and that we must change with them. The education which fifty years ago would have been generous no longer fits a man for the contests of life. The whole movement of physical science and the applied and mechanical sciences is toward a point at which the unskilled workman must disappear.

We frequently meet the suggestion that prominent men of the past were provided with but a scanty education preparatory to a useful influential life, and we do not reflect, as we should, that prominence is merely relative. If these men so distinguished in our histories, as revered in our memories, could be fairly brought into relation with our own times they would possibly lose much of their preeminence Within our own knowledge many men of prominence in the generations just back of us need perspective for the preservation of their traditional abilities Therefore we must inquire in regard to the education which we furnish, as to its sufficiency for the objects which justify its mere existence. Those who regard education as a right will admit that the right is valueless unless sufficiently extensive to pay for its assertion. It is upon this idea that communities have proceeded, even if unconsciously, in demanding home education for home talent whenever it existed to an extent sufficient to justify its development. Hence, in public schools, regarded as the people's schools (and carefully distinguishing the true people from the people of the demagogue, and with equal care from the people of the believer in political caste), it is reasonable, and indeed imperatively necessary, that a sufficiency of education should be furnished, notwithstanding the fact that many will, from the necessities of their individual life, be unable to avail themselves of these advantages."—"The Justification of the Public High School," by H. H. MORGAN.

"It may be in order to remark here that we are not now discussing the high-school question in general. The battle for the free high school has been fought and won. In every city and village the children of rich and poor alike have free access through the high-school portal to the wider and higher mental life, with its better preparation, not only for personal power, but also for social function, whether industrial, professional, or commercial. The people's verdict has been given and we shall not reopen the argument. Our object is simply to point out this very evident corollary—that the country boy is as rightfully entitled as his city neighbor to all these free privileges; and that there are even some reasons for urging his claims with greater emphasis. Yet, strange to say, with few and recent exceptions our whole country population has remained without free-school privileges beyond the elementary course as provided in the ungraded rural schools.

It is unnecessary to compare the importance of the high school with that of the college or the elementary school. There is no doubt that primary and higher education have received attention first in nearly all our States. As a matter of educational history, the secondary school has grown up first in the shadow of the college, to supply preparation for college courses. 'To fit for college' was its original purpose. The primary school has always stood upon its own utility; so has the college and the university. But it is only within recent years that the high school has been recognized as having within itself the reasons for its existence. Chief among these reasons, from the standpoint of society, is the discovery of genius. The great importance to the public of discovering those best fitted by nature to go on to higher attainments has been recognized ever since the days of Plato. Huxley declares that 'If the nation could purchase potential Watt or Davy or Faraday at the cost of a hundred thousand pounds, he would be dirt cheap at the money in the narrowest economical sense of the word.' What arithmetic can compute the possible unknown loss to society through all the past by failure to discover and develop the latent possibilities of genius?

There is every reason to suppose that many of these are to be found among the children reared in the more natural and normal conditions of rural life. From the standpoint of social utility a better case could probably be made out in favour of free high-school training for country pupils than for those in the city; but no such comparison is necessary, for only equality is asked; and equal opportunity for secondary instruction, irrespective of place of residence, is something so just and so imperative that its claims can no longer be ignored anywhere.

Huxley's famous ideal of the free school system, a ladder from gutter to University, has come near to realization in most of our American States. The free school's triumph over the fee school is all but universal; and we tell with just pride how even the child of poverty can make his way to the highest places in scholarship. But one part of the ladder still remains defective, and for rural communities absent altogether.

The American free school offers to practically all the people everywhere free instruction for children in the elementary grades. If the people are fortunate enough to live in cities or villages, their children have also free instruction in the secondary grades, since in all sections of the country free high schools are maintained in and for the cities. But the free school opportunities of the country boy and girl have generally come to an abrupt end with the elementary course. True, the State universities have offered them college instruction if they would somehow climb over the gap between the grammar school and the college.

One by one the remaining imperfections in our free school system come up for consideration and remedy. In their turn, we Americans attack our public problems in what seems to us the order of their importance and need. To some of us this question of secondary education for rural pupils has seemed to wait beyond its rightful time. But its hour has struck at last, and it is safe to say that few questions of educational administration have been receiving more general attention than this one, within the last few years. This attention has, however, been given with but little ostentation; and it will not be strange if some should express surprise to hear it ranked among the prominent educational problems of the day. Each State seems to have attacked the problem in its own way and with little regard to what other States were doing. The movement has received its impetus less from the great educators of the nation than from the teachers and people of the several States. Thus, almost unknown to each other, impelled by inward conditions rather than by theories impressed from without, a dozen States have been seeking some way to fill in for their rural pupils the high school rounds of the free school ladder." —"Free High Schools for Rural Pupils" by Henry R. Corbett, Chicago.

VII. Technical Education.

The addition of Domestic Science made to the school programme in 1899, marks another epoch in the development of education in Ontario. The organization and equipment of the Normal School of Domestic Science at Hamilton has enabled several young women to prepare themselves to teach the subject. Through the liberality of Mrs. Massey-Treble, another institution for the training of teachers in this department has

been established in Toronto. This institution—The Lillian Massey Normal Training School of Household Science (formerly The Victor School of Household Science and Arts)—has been planned to some extent on the basis of the Normal courses followed at Drexel Institute, Philadelphia, and Pratt Institute, Brooklyn, and embodies the advanced methods of this department as taught in those distinguished institutions. Domestic Science is also taught in connection with the Young Women's Christian Association and the Young Women's Christian Guild, Toronto In the Toronto Technical School a forward step has also been taken in providing an excellent course in Domestic Science. Already several of the Public School Boards are taking the initiative in the matter. This subject is taught or is about to be taught in Hamilton, Stratford, Kingston, Brantford, Renfrew, Ottawa, Woodstock, etc. A kitchen has been equipped for the purpose in the London Normal School. It may be expected before long that the large towns and cities, at least, will provide instruction in Domestic Science.

Doubtless the cost of equipment and the salaries of competent teachers have made Boards hesitate to provide facilities for the teaching of Domestic Science. It is hoped, however, that the expenditure required will not long stand in the way, and that a better knowledge of the science of education will remove some of the hindrances, to its introduction. It is yet erroneously assumed in many places that a knowledge of the affairs of life should be gained after the school days are over, and that when a child leaves school she is presumed to throw aside her books and to acquire a knowledge of what pertains to household affairs. The educational outlook will be brighter when there is a closer connection between the school and every-day life Too often there is a disposition to regard the introduction of industrial pursuits as utilitarian, or even menial. It is to be hoped that a readier recognition will be given to that kind of training in the Public Schools, which will have a direct application to industrial life. The break between the school life and the home life of girls will then, to a larger extent, disappear, and that isolation of the school from society, which many leading educationists deplore, will no longer be so apparent.

It is evident the traditional methods of instruction have also much to do with the delay noticed in adding Domestic Science, as well as Manual Training, to the school programme. Laboratory methods have largely revolutionised systems of instruction. The library alone no longer affords the best means of obtaining a practical education. The laboratory, already valuable in the departments of higher education, should receive due recognition in elementary schools. Is it not possible that our views of education are too largely dominated by the mediaeval conceptions of learning? There is too great a tendency, even yet, to regard the imparting of knowledge as the main duty of the teacher. Since the time of David P. Page the "pouring in" process may be less prevalent, and yet the danger has not disappeared of regarding the acquisition of knowledge as the chief purpose of the school. Children should be trained to do, to create, and to produce, and to apply their information even before the school days are over A knowledge of the materials they handle, the forces they are to direct and the articles they are to produce should receive more attention. Too often the vast fields which natural science has brought to view within the last one hundred years are largely ignored or if they receive recognition, this recognition is supposed to be obtained by means of books. It is now well recognized among educationists that to give lessons in "nature study," or in the elementary portions of the sciences which pertain to household affairs, cannot be accomplished without laboratory equipment. The laboratory equipment for Domestic Science is not extensive, but it is, of course, essential.

It may be assumed that the school curriculum of a century ago will not do for to-day. The human capacity has its limitations, and, therefore, if modern subjects are to have a place on the school course, some re adjustment of the programme is necessary. The time has gone by when only those in the higher walks of life should be educated. Every section of the community has its claim to knowledge and culture. Few women, however, can be released, nor is it desirable that they should be released, from duties pertaining to the household. Under these circumstances, it goes without saying that the mistress of a home should not be ignorant of the most elementary knowledge of Domestic Science, even though she may be in a position to depend upon servants for the care of her home. It is not too much to claim, that every woman should understand cooking, sewing, laundry work, home decoration, etc. If Domestic Science is taken up in the Public Schools in our

cities, a marked improvement may be expected to follow in the conditions of Canadian homes. The habits and tastes of girls, if improved, will produce increased interest among parents in the education of their children. Tha practical economy that will be cultivated regarding domestic affairs will, in itself, more than compensate for the small outlay to be incurred.

In other departments of technical education, the attention given to the subject by the public is also encouraging. The attendance at the School of Practical Science, which has made such great progress since its establishment, has warranted an increased expenditure for its equipment and maintenance. To this institution the Province will necessarily look for efficiency in the higher departments of applied science or technical education. The development of the new parts of Ontario, and the growth of our industries generally, make it essential that an institution, which has specially in view the material welfare of the country, should be liberally supported by the Legislature. It is, however, between the lower and the higher institutions of learning that the break in training in what may be deemed practical in character, is most apparent. The Kindergarten and the School of Practical Science should have the missing links supplied. Unfortunately when the child after passing through the Kindergarten enters upon the Public and High School courses his attention is usually diverted from the kind of training he has been receiving and his time is mainly occupied with the acquisition of knowledge. In the Public School and High School, as well as in the Kindergarten and School of Practical Science, there should be afforded facilities for becoming practically acquainted with the ordinary agricultural, mechanical and commercial pursuits. To supply these wants, Manual Training and other departments of technical education have been added to the school programmes.

In addition to what has been done through the liberality of Sir William Macdonald, and the instrumentality of Professor Robertson of Ottawa, several School Boards have taken steps to move in harmony with the general trend of educational development. In some towns and cities, schools are already in operation, and in other places it may be expected classes will be established by the end of another year. Among those cities and towns where Manual Training is now taught may be mentioned, Toronto, Kingston, Brantford, Stratford, Woodstock, Renfrew, Brockville and Ottawa. In Brantford and Stratford commodious buildings have been provided for Technical Education.

As in the case of Domestic Science, there is no doubt that the cost of buildings, equipments, and salaries of competent teachers, stands in the way of greater progress It is nevertheless true, that the reluctance to depart from the long established programmes of study is the chief hindrance to the development of technical education. Reforms in education as a rule come slowly, and doubtless conservatism often serves a good purpose in preventing the hasty introduction of subjects which sometimes turn out to be mere fads. In the matter of technical education, however, the experimental stage in this department has already passed if we are to be guided by what has been done in Germany, France, England and the United States. It is just as well to admit that in the matter of practical or industrial education, there is great need of progress in Ontario. The resources of our Province are great, and the young men trained in our schools should be prepared to take their part in its development.

The impression also lingers in many quarters that Manual Training is simply of economic value. Its benefits as a valuable means of education are not sufficiently understood. This is doubtless largely due to the fact that other subjects have held the entire field too long. In ordinary school work, the child's hand is not sufficiently cultivated and the education of to-day stultifies itself in seeking to work through instruction and by the acquisition of knowledge. The pedagogical truth, of "knowing by doing", has slight recognition, and though insight is fostered, the will is not sufficiently trained. Indeed it is not too much to say that too often the intellect is pampered, and that the cultivation of a well-balanced and self reliant nature is largely neglected. The educational reform introduced by Pestalozzi, in the principle of observation, is seldom completed. The demand he made in the name of education, can only be properly filled, at least in cities, by instruction in Manual Training, which affords the child training in observation and attention. The pupil is led from observation through practical work to actual experiments, and thus reaches the principle of instruction which lies at the root of true educational progress. It is only in directions of this kind that the education of our schools can be made to bear the best fruit. When children are afforded the opportunity of observing

and learning by experience, and in shaping and producing by the exercise of their own powers, the mental development secured will be more valuable than when the training is entirely confined to that which is obtained from books.

It is evident the foundations of technical education must be laid in our Public Schools. In other words, the break already referred to will not be fully supplied by having technical education taken up in our High Schools and having the training of the hand and the eye neglected in the Public Schools. The Austrians and Germans realized this view in 1873 when they found their trade had declined, and when they felt they must keep abreast of other nations Technical schools in those countries were fitted for various trades, but it was soon discovered that the students who came to these schools were most inadequately prepared. They had no training in drawing, and could neither see nor set to work aright A distinguished authority on the industrial condition of Austria pointed out that scholars should be prepared in the elementary schools before admission into the technical schools. He contended that unless Manual Training were taken up in the elementary schools, it would be like trying to erect "a Colossus on feet of clay". He contended that the teaching of manual dexterity in public elementary schools must be the broad foundation upon which the monument of trade was to be built. He also urged that in order to be able to compete in the market of the world, "the dead word should be forced in some degree to give place to the living deed". Germany has had a similar experience. Those who remember the character of the Exhibition in Philadelphia in 1876 and compare the exhibits of that nation at the World's Fair in 1893 will recognize the revolution which has been the result of altered views in education The imperfections of German industry a quarter of a century ago have been surprisingly removed by the establishment of Manual Training Schools. The social conditions of Europe should not, however, in this connection be overlooked. The class distinctions of Germany give rise to differentiations in the matter of education, which are neither possible nor desirable in this country. The boys intending to enter the professions, as well as those who will follow mechanical, agricultural and commercial pursuits, must be trained in the same Public and High Schools, and hence the break in so called practical education must be remedied in the Public Schools. It thus follows that there should be no omission of subjects leading to industrial pursuits in elementary, secondary or higher education. Schools, elementary or advanced, must not be allowed to foster knowledge one-sided in its character. They must all give opportunity for cultivating the power of "doing". In this way there will be no marked dividing line between skilled and unskilled labourers. It will become the object of artisans, no matter how humble their pursuits may be, to perform their work with skill, taste and ambition. This object cannot be secured simply by the foundation of technical schools, whilst the elemetary schools continue to give what is to some extent an education of a one-sided character. In the Public Schools children should be taught to use their hands to develop the sense of form, and to have their hearts filled with the love of work. In this way only will the work of technical schools be founded on a solid basis, and the establishment of trade schools, which would not be received with public favour, will not call for attention as it does in some aristocratic countries; indeed, the words of the French educationist, M. Ferry, meets the situation. Referring to the general training of the hand and eye, he said, "The prominent character of Manual Training is that it is not mere technical instruction in a definite trade or profession; it is a training in manual dexterity without specialization to any particular craft."

May it not be inferred that much of the disposition which is shown by some boys to shun physical activity is due to a wrong conception of education? Constantly the book alone is placed in the child's hand as a means of education, but he is not taught in school to use the hand, except perhaps in writing and drawing, and, therefore, he considers its functions as inferior to those of the brain. The tendency to regard manual work as only meant for meaner intelligences becomes tacitly assumed as the boy advances in life. The false conception of education thus fostered loses in the interests of economic life much valuable intelligence. The tendency to disparage practical work becomes rooted and exercises a pernicious influence upon the choice of life's work. There is a rush to head work, whilst the demand for intelligent hand work is never fully met. If the training in school is one-sided it perverts the interests of boys in the various callings, and an unhealthy social condition and recognized social dangers come to the front. The masses

of the people must necessarily follow the more humble walks of life, but it does not follow that the masses of the people should be ignorant. They should not only understand the ordinary duties of citizenship, but should have marked skill in the performance of what pertains to their pursuits. The interests of society require that not only should their be a proper appreciation of labour, but that the different classes of society should live together in peace, esteeming and respecting the work of one another. On the common ground of Manual Training, the rich and the poor in our Public Schools can meet on a friendly footing, and those whose different positions in life too often induce disregard or even mutual antagonism would be reconciled and enjoined in greater harmony. It should not be forgotten that in many cases the unskilled work done in factories is significant of a very low level of mechanical labour. The monotony of life in machine shops turns out vast masses of material, but the occupation fails frequently to inspire a love of work. It is reasonable to hope that the introduction of Manual Training will do much towards reconciling social customs and soften social prejudices.

In this connection it is appropriate to notice the action taken by the Legislature in providing, by a liberal expenditure, that the science departments of the University may hereafter receive special attention. Apart from the wider scope which the University may be able to assume in other departments, it is fitting that the modern demands which science has made should not be overlooked. The advancement of science has during the last few decades revolutionized nearly all our industries, and if we are to hold our own as a people, the altered conditions must be recognized. The duty is more apparent when the value of our resources is taken into account. The abundant opportunities which the Province has for a forward movement in agricultural, mechanical, mining and lumbering operations will justify increased attention to those subjects of education which have particularly to do with what very materially concerns nearly all classes of our population. On this account instruction in science (pure and applied) should not only receive increased attention in the elementary and secondary schools, but also in the University and the School of Practical Science. The conditions fully justify the Province in assuming the responsibility of meeting expenditures heretofore borne by the University.

VIII. Conclusion.

There are several other topics pertaining to the welfare of our schools that have been engaging the attention of the Education Department. Among them is that of the "Consolidation of School Sections," which has also received some discussion in the public press. Through the kindness of the authorities of Pennsylvania, I was enabled to furnish the Inspectors and Members of the Legislature with an important report on the question as it affects the rural districts of that State. It is quite probable that the most prudent steps, for the present at least, towards Consolidation in Ontario, would be for school sections in the neighborhood of a town or village to unite in supporting Continuation Classes.

It is satisfactory to learn that increased attention is given in rural schools to "Nature Study," and that pupils receive much instruction in elementary natural science. A deeper interest in the development of agriculture and other industries is manifest.

The formation of Cadet Corps in connection with our High Schools and Collegiate Institutes has had an excellent effect upon those institutions. The number of Corps formed has increased, and has fully justified the expenditure incurred.

To improve the status of the teacher should still be regarded as the most important question for future consideration.

In order to have the statistics of our High and Public Schools brought as soon as possible to the attention of the Legislature, the Annual Report is divided into Parts I. and II. The information to be given in Part II. will consist of several valuable reports, together with some statistics not available until after the close of the year. This portion of the Report will also be published at as early a date as possible.

I have the honour to be, Sir,
Your obedient servant,

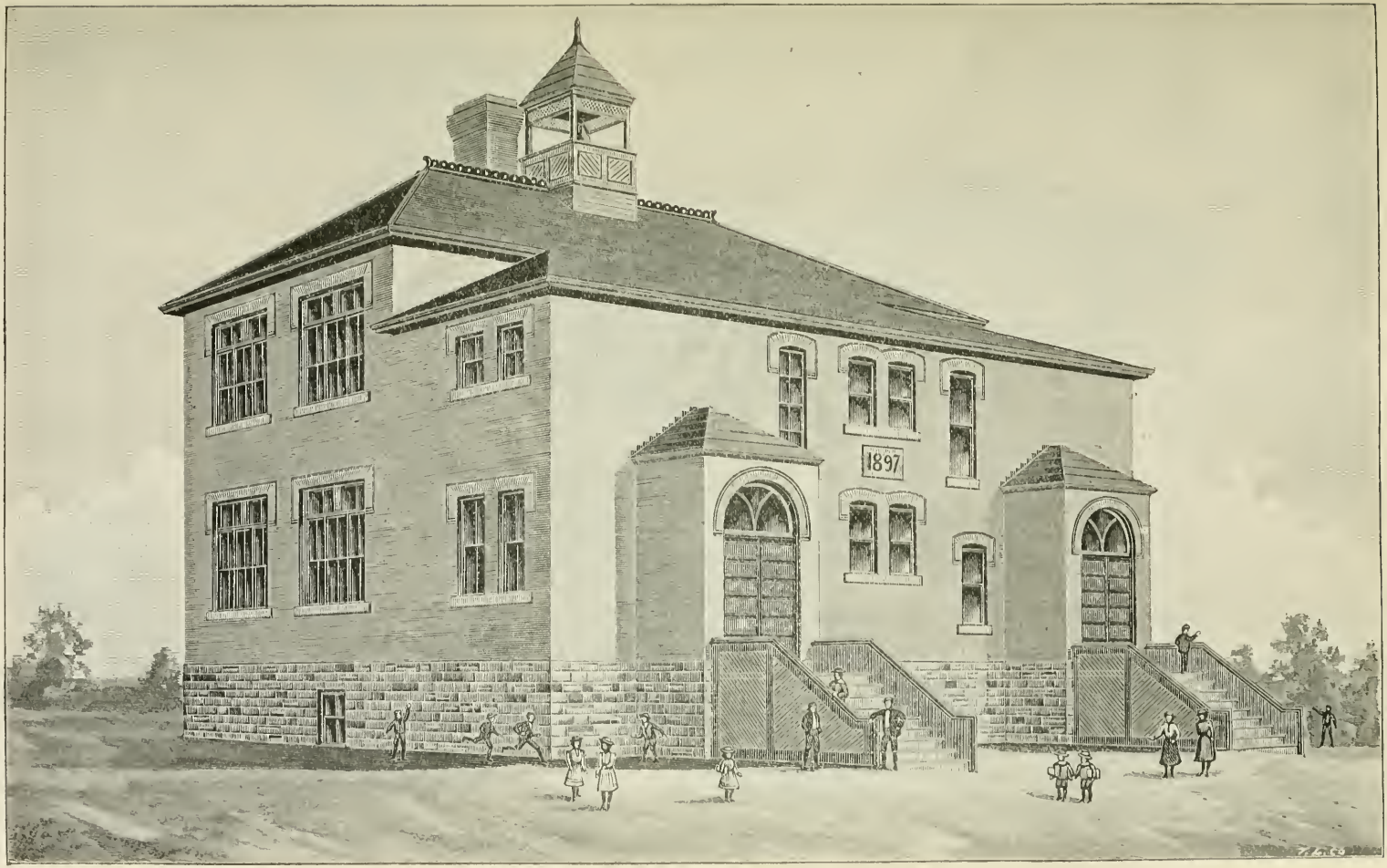
RICHARD HARCOURT,
Minister of Education.

Education Department,
Toronto, January, 1902.

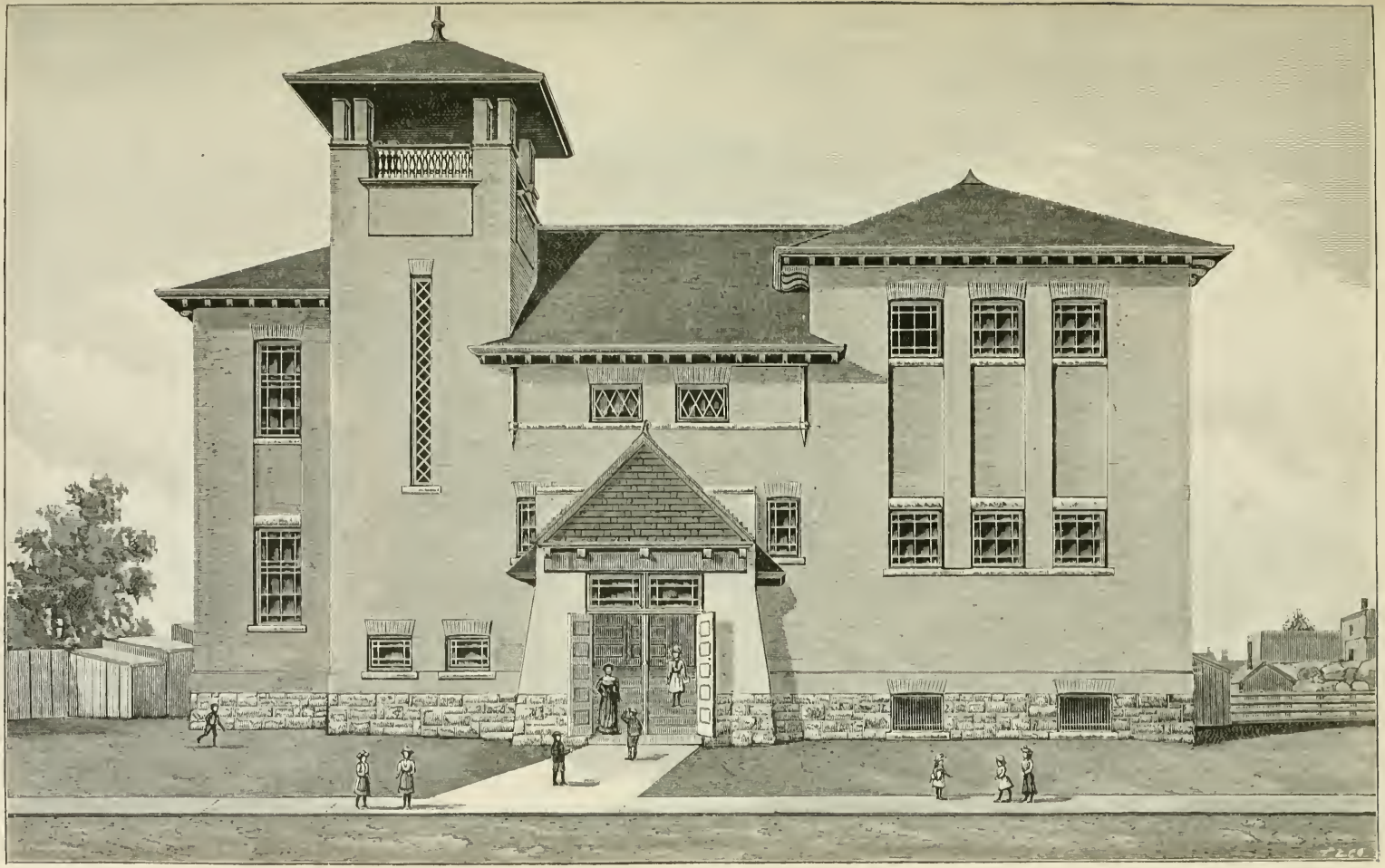
Fort William Ward Public School. (Used for the High School.)

Sault Ste. Marie Central Public School.

North Bay Public School.



KEEWATIN PUBLIC SCHOOL.



STURGEON FALLS PUBLIC SCHOOL.

Doe Lake Public School, No. 2, Township Ryerson.

APPENDICES.

APPENDIX A.—*STATISTICAL TABLES*

THE PUBLIC SCHOOLS.

I.—Table A.—School Population, Attendance, etc.

Counties (including incorporated villages, but not cities or towns), etc.	School population, between 5 and 21 years of age.	Pupils under 5 years of age.	Pupils between 5 and 21 years of age.	Pupils over 21 years of age.	Total number of pupils of all ages attending school.	Boys.	Girls.	Average attendance of pupils	Percentage of average to total attendance.
1 Brant	3,629	7	3,214	1	3,222	1,717	1,505	1,787	55
2 Bruce	14,270	19	11,252	5	11,276	5,926	5,350	6,252	55
3 Carleton	9,685	36	6,847	2	6,885	3,651	3,234	3,235	47
4 Dufferin	5,172	31	4,683	4	4,718	2,509	2,209	2,116	45
5 Dundas	5,277	33	4,548	....	4,581	2,350	2,231	2,480	54
6 Durham	5,358	16	4,689	1	4,706	2,426	2,280	2,469	52
7 Elgin	7,243	22	6,315	4	6,341	3,282	3,059	3,425	54
8 Essex	11,089	22	8,410	1	8,433	4,293	4,140	4,081	48
9 Frontenac	6,753	52	5,678	1	5,731	3,006	2,725	2,447	43
10 Glengarry	4,654	29	4,191	1	4,221	2,194	2,027	1,934	46
11 Grey	*15,726	89	13,749	15	13,853	7,181	6,672	6,266	45
12 Haldimand	5,447	28	3,986	1	4,015	2,150	1,865	2,428	60
13 Haliburton, N.E., Muskoka, S., Nipissing, and E. Parry Sound.	6,865	46	5,418	2	5,466	2,867	2,599	2,212	40
14 Halton	5,018	3	3,493	...	3,496	1,820	1,676	1,889	54
15 Hastings	11,410	35	8,922	2	8,959	4,654	4,305	4,307	48
16 Huron	15,498	15	11,269	5	11,289	5,921	5,368	6,595	58
17 Kent	9,015	21	8,725	1	8,747	4,579	4,168	4,253	49
18 Lambton	12,133	25	9,534	3	9,562	4,982	4,580	5,243	55
19 Lanark	5,906	13	4,457	....	4,470	2,298	2,172	2,339	52
20 Leeds and Grenville	11,120	55	9,338	8	9,401	4,785	4,616	4,564	49
21 Lennox and Addington	4,990	13	4,472	3	4,488	2,340	2,148	2,051	46
22 Lincoln	4,281	19	3,931	....	3,950	2,050	1,900	2,003	51
23 Middlesex	11,987	13	9,565	....	9,578	5,009	4,569	5,506	57
24 Norfolk	*7,872	37	5,965	3	6,005	3,122	2,883	3,043	51
25 Northumberland	7,723	16	6,111	1	6,128	3,218	2,910	3,149	51
26 Ontario	8,500	19	7,285	3	7,307	3,933	3,374	3,834	52
27 Oxford	9,325	2	7,154	2	7,158	3,715	3,443	4,211	59
28 Peel	5,425	3	4,116	1	4,120	2,223	1,897	2,108	51
29 Perth	9,294	18	6,779	3	6,800	3,673	3,127	3,837	56
30 Peterborough	7,164	24	5,348	....	5,372	2,779	2,593	2,684	50
31 Prescott and Russell	10,928	45	5,613	1	5,659	2,935	2,724	2,552	45
32 Prince Edward	3,128	19	2,930	1	2,950	1,507	1,443	1,507	51
33 Renfrew	*11,197	41	7,769	7	7,817	3,935	3,882	3,128	40
34 Simcoe and W. Muskoka	18,118	32	15,872	4	15,908	8,329	7,579	8,302	52
35 Stormont	5,008	23	4,178	....	4,201	2,182	2,019	2,094	50
36 Victoria and S. E. Muskoka	7,741	25	6,951	1	6,977	3,642	3,335	3,326	48
37 Waterloo	8,666	7	6,422	1	6,430	3,443	2,987	3,951	61
38 Welland	6,253	14	5,247	....	5,261	2,730	2,531	2,674	51
39 Wellington	13,816	12	8,359	4	8,375	4,441	3,934	4,458	53
40 Wentworth	*6,798	...	4,952	....	4,952	2,629	2,323	2,620	53
41 York	14,082	44	11,918	11	11,973	6,274	5,699	6,210	52
42*District of Algoma	7,383	32	6,119	9	6,160	3,131	3,029	2,664	43
43 N. Nipissing & W. Parry Sound	*4,492	32	4,113	2	4,147	2,153	1,994	1,599	39
44 Moose Fort	70	1	61	...	62	21	41	39	63
Total	365,509	1,088	289,948	114	291,150	152,005	139,145	147,872	51
Cities.									
1 Belleville	3,000	....	1,530	...	1,530	773	757	899	59
2 Brantford	3,026	...	2,657	....	2,657	1,346	1,311	1,901	71
3 Chatham	2,345	.....	1,635	....	1,635	821	814	1,089	67
4 Guelph	3,309	.....	1,740	...	1,740	882	858	1,260	72
5 Hamilton	14,319	....	8,144	....	8,144	4,113	4,031	5,988	72
6 Kingston	5,800	.....	2,733	....	2,733	1,348	1,385	2,092	77
7 London	10,771	.....	6,111	...	6,111	3,106	3,005	4,243	69
8 Ottawa	16,456	1	5,505	...	5,506	2,909	2,597	3,370	61
9 St. Catharines	2,298	.....	1,480	...	1,480	725	755	991	67
10 St. Thomas	4,572	.....	2,071	...	2,071	1,023	1,048	1,506	73
11 Stratford	2,969	....	1,554	....	1,554	801	753	1,107	71
12 Toronto	53,420	13	29,784	4	29,801	14,883	14,918	23,553	79
13 Windsor	3,559	2	2,360	....	2,362	1,228	1,134	1,709	72
Totals	125,844	16	67,304	4	67,324	33,958	33,366	49,708	73

* Statistics of preceding year, wherever an asterisk appears in Tables A to E.

THE PUBLIC SCHOOLS —*Continued.*

I.—Table A.—School Population, Attendance, etc —*Continued.*

Towns.	School population, between 5 and 21 years of age.	Pupils under 5 years of age.	Pupils between 5 and 21 years of age.	Pupils over 21 years of age.	Total number of pupils of all ages attending school.	Boys.	Girls.	Average attendance of pupils.	Percentage of average to total attendance.
1 Alliston	400	1	359	....	360	182	178	217	60
2 Almonte	972	.....	374	1	375	191	184	237	63
3*Amherstburg	642	....	285	....	285	157	128	170	60
4 Arnprior	976	.....	613	....	613	307	306	400	65
5 Aurora	495	.....	347	....	347	164	183	218	63
6 Aylmer	543	.....	440	....	440	198	242	295	67
7 Barrie	1,308	.....	1,208	..	1,208	594	614	753	62
8 Berlin	2,957	....	1,408	....	1,408	767	641	1,057	75
9 Blenheim	464	...	430	....	430	230	200	269	63
10 Bothwell	241	....	192	....	192	103	89	134	69
11 Bowmanville	682	....	494	....	494	247	247	331	67
12 Bracebridge	876	.....	820	....	820	447	373	406	50
13 Brampton	611	.....	486	....	486	268	218	351	72
14 Brockville	2,719	.....	1,357	....	1,357	681	676	957	71
15 Carleton Place	1,275	....	857	....	857	430	427	575	67
16 Clinton	503	.....	483	....	483	255	228	324	67
17 Cobourg	1,142	.....	573	....	573	296	277	375	65
18 Collingwood	1,584	....	1,293	...	1,293	646	647	823	64
19 Cornwall	1,099	....	647	....	647	341	306	427	66
20 Deseronto	1,135	.....	670	....	670	323	347	491	73
21 Dresden	463	.....	406	....	406	188	218	269	66
22 Dundas	733	.....	537	....	537	280	257	387	72
23 Dunnville	536	.....	436	..	436	230	206	280	64
24 Durham	500	.....	391	....	391	205	186	255	65
25 Essex	450	.....	355	....	355	176	179	199	56
26 Forest	456	....	319	....	319	166	153	217	68
27 Fort William	1,100	.....	877	....	877	446	431	411	47
28 Galt	1,684	.....	1,383	....	1,383	687	696	1,037	75
29 Gananoque	1,255	.....	752	....	752	400	352	510	68
30 Goderich	1,019	.....	687	...	687	335	352	484	70
31 Gore Bay	356	.....	239	...	239	114	125	118	49
32 Gravenhurst	*762	.....	609	....	609	296	313	350	57
33 Harriston	411	1	358	....	359	190	169	234	65
34 Hawkesbury	800	...	148	....	148	70	78	78	53
35 Ingersoll	1,710	.....	780	....	780	396	384	535	69
36 Kincardine	628	.....	446	...	446	209	237	279	63
37 Leamington	563	....	494	1	495	238	257	349	71
38 Lindsay	1,455	....	1,105	....	1,105	554	551	776	70
39 Listowel	660	3	654	....	657	348	309	419	64
40 Little Current	221	....	194	....	194	91	103	81	42
41 Mattawa	344	.....	101	....	101	54	47	55	55
42 Meaford	493	.....	395	....	395	205	190	265	67
43 Midland	950	.....	749	....	749	363	386	390	52
44 Milton	461	.....	389	....	389	190	199	264	68
45 Mitchell	654	..	471	....	471	244	227	313	66
46 Mount Forest	570	..	457	....	457	264	193	317	69
47 Napanee	779	.....	601	....	601	287	314	410	68
48 Newmarket	591	...	415	....	415	200	215	279	67
49 Niagara	242	....	271	...	271	145	126	132	49
50 Niagara Falls	498	.....	654	..	654	336	318	459	70
51 North Bay	683	..	524	1	525	250	275	274	52
52 North Toronto	436	.....	473	...	473	232	241	247	52
53 Oakville	464	.....	343	....	343	175	168	203	59
54 Orangeville	950	...	527	..	527	241	286	339	64
55 Orillia	1,620	.....	1,006	....	1,006	516	490	691	69
56 Oshawa	1,164	.....	782	....	782	369	413	512	65
57 Owen Sound	1,977	....	1,470	..	1,470	733	737	980	67
58 Palmerston	519	.....	465	....	465	223	242	284	61
59 Paris	944		523		523	283	240	377	72

THE PUBLIC SCHOOLS —*Continued.*

I.—Table A.—School Population, Attendance, etc.—*Concluded.*

Towns.	School population, between 5 and 21 years of age.	Pupils under 5 years of age.	Pupils between 5 and 21 years of age.	Pupils over 21 years of age	Total number of pupils of all ages attending school.	Boys.	Girls.	Average attendance of pupils.	Percentage of average to total attendance.
60 Parkhill	450	.....	244	....	244	126	118	166	68
61 Parry Sound	1,021	.. .	776	....	776	396	380	407	52
62 Pembroke	1,485	.....	666	....	666	361	305	443	67
63†Penetanguishene	785	.....	590	....	590	297	293	335	57
64 Perth	1,040	....	568	....	568	289	279	376	66
65 Peterborough	2,818	.....	1,653	....	1,653	815	838	1,183	72
66 Petrolea	1,288	.....	944	..	944	470	474	603	64
67 Picton	835	.....	618	....	618	332	286	363	59
68 Port Arthur	832	.....	507	....	507	270	237	297	59
69 Port Hope	940	.....	830	..	830	430	400	582	70
70 Prescott	655	.....	407	....	407	198	209	261	64
71 Preston	842	.....	378	....	378	186	192	275	73
72 Rat Portage	1,185	.....	1,055	....	1,055	541	514	664	63
73 Renfrew	931	.....	469	...	469	226	243	294	63
74 Ridgetown	*665	2	490	....	492	247	245	310	63
75 St. Mary's	911	.....	780	...	780	386	394	397	51
76 Sandwich	409	....	311	....	311	139	172	162	52
77 Sarnia	2,358	. ..	1,423	....	1,423	704	719	962	68
78 Sault Ste. Marie	1,710	....	1,033	...	1,033	550	483	478	46
79 Seaforth	468	...	432	....	432	220	212	289	67
80 Simcoe	667	.....	490	....	490	274	216	303	62
81 Smith's Falls	1,350	.....	1,055	....	1,055	524	531	734	70
82 Stayner	370	...	322	..	322	148	174	182	56
83 Strathroy	750	....	587	....	587	281	306	410	70
84 Sturgeon Falls	323	.....	166	....	166	90	76	84	51
85 Sudbury	257	....	251	....	251	112	139	146	58
86 Thessalon	222	.....	238	....	238	112	126	92	39
87 Thornbury	243	..	184	....	184	100	84	115	62
88 Thorold	605	.....	339	....	339	170	169	165	49
89 Tilsonburg	632	.....	452	...	452	235	217	293	65
90 Toronto Junction	1,755	.	1,371	....	1,371	717	654	828	60
91 Trenton	1,222	.....	651	....	651	311	340	401	62
92 Uxbridge	473	....	398	...	398	189	209	263	66
93 Vankleekhill	372	.....	207	....	207	116	91	134	65
94 Walkerton	627	.	529	.. .	529	254	275	370	70
95 Walkerville	485	. ...	273	....	273	145	128	182	67
96 Wallaceburg	875	.....	611	4	615	301	314	367	60
97 Waterloo	935	.....	638	.	638	320	318	492	77
98 Welland	401	.....	364	....	364	189	175	245	67
99 Whitby	683	. ...	420	...	420	227	193	265	63
100 Wiarton	725	.....	580	....	580	299	281	362	62
101 Wingham	1,034	.....	514	..	514	244	270	349	68
102 Woodstock	1,900	....	1,673	....	1,673	830	843	1,228	73
Totals	89,152	7	61,609	7	61,623	31,127	30,496	39,726	64
Totals.									
1 Counties, etc	365,109	1,088	289,948	114	291,150	152,005	139,145	147,872	51
2 Cities	125,844	16	67,304	4	67,324	33,958	33,366	49,708	73
3 Towns	89,152	7	61,609	7	61,623	31,127	30,496	39,726	64
4 Grand totals, 1900	580,105	1,111	418,861	125	420,097	217,090	203,007	237,306	56
5 " 1899	586,350	1,246	427,841	140	429,227	222,566	205,661	243,325	57
6 Increases	.....	...	....	....	.....	.....	.....	.....	....
7 Decreases	6,245	135	8,980	15	9,130	5,476	3 654	6 019	1
8 Percentages	.....	.26	99 71	.03	.....	51.67	48 33	..	.

† Including Protestant Separate School

NOTE.—In addition, there were 11,234 Kindergarten pupils and 795 Night School pupils.

THE PUBLIC

II —Table B.—Number of pupils in the

Counties (including incorporated villages, but not cities or towns), etc.	Reading.						Writing.	Arithmetic.	Drawing.
	1st Reader Part I.	1st Reader Part II.	2nd Reader.	3rd Reader.	4th Reader.	5th Reader.			
1. Brant	574	422	629	800	618	179	3,222	3,222	3,222
2. Bruce	2,612	1,719	1,934	2,365	2,098	548	10,938	11,002	10,796
3. Carleton	1,641	1,018	1,265	1,292	1,366	303	6,570	6,714	6,315
4. Dufferin	1,070	758	883	879	891	237	4,671	4,417	4,093
5. Dundas	1,124	781	907	776	790	203	4,499	1,571	4,469
6. Durham	837	680	1,038	1,065	887	199	4,706	4,706	4,706
7. Elgin	1,217	845	1,278	1,164	1,351	486	6,270	6,286	6,138
8. Essex	2,440	1,580	1,729	1,465	1,041	178	8,076	8,134	8,016
9. Frontenac	1,389	881	970	1,232	1,154	105	5,731	5,509	5,365
10. Glengarry	1,217	604	1,005	647	653	95	4,218	4,218	4,218
11. Grey	3,233	2,160	2,959	2,958	2,021	522	13,247	13,544	13,294
12. Haldimand	774	600	777	798	894	172	3,994	4,000	3,635
13. Hal'b't'n, N.E.Mus., S. Nipissing and E. Parry Sound	1,597	910	1,076	1,037	668	178	5,120	5,013	4,315
14. Halton	763	542	550	745	706	190	3,496	3,496	3,496
15. Hastings	2,331	1,616	1,806	1,667	1,250	289	8,708	8,815	8,595
16. Huron	1,786	1,381	2,127	2,494	2,649	852	11,119	11,192	10,768
17. Kent	2,102	1,310	1,731	1,586	1,521	497	8,568	8,673	8,468
18. Lambton	2,242	1,676	1,667	1,812	1,734	431	9,301	9,431	8,885
19. Lanark	1,071	718	883	898	734	166	4,470	4,470	4,470
20. Leeds & Grenville	2,217	1,167	1,728	1,834	2,130	325	8,963	9,018	8,525
21. Lennox & Addington	1,028	633	780	922	972	153	4,488	4,488	4,488
22. Lincoln	850	531	717	793	991	68	3,836	3,845	3,694
23. Middlesex	1,663	1,348	1,686	2,023	2,295	563	9,578	9,578	9,578
24. Norfolk	1,275	902	1,165	1,023	1,391	249	5,849	5,842	5,627
25. Northumberland	1,165	903	1,227	1,327	1,280	226	5,983	6,028	5,718
26. Ontario	1,419	1,008	1,316	1,588	1,657	319	6,867	7,105	6,888
27. Oxford	1,313	1,056	1,276	1,408	1,556	549	7,071	7,034	6,541
28. Peel	795	655	719	907	832	212	4,092	4,097	4,016
29. Perth	1,299	904	1,110	1,781	1,451	255	6,684	6,716	6,265
30 Peterborough	1,240	894	945	1,080	1,057	156	5,184	5,310	4 837
31. Prescott & Russell	1,830	955	970	965	759	180	5,228	5,540	5,170
32. Prince Edward	509	333	454	564	843	247	2,924	2,934	2,902
33. Renfrew	2,256	1,225	1,377	1,454	1,199	306	7,543	7,760	7,189
34. Simcoe & W. Musk.	3,756	2,481	3,059	3,068	2,713	831	15,290	15,590	14,885
35. Stormont	1,035	597	989	718	706	156	4,196	4,182	4,011
36. Victoria & S.E. Mus.	1,501	978	1,459	1,426	1,335	278	6,698	6,857	6,787
37. Waterloo	1,276	1,003	1,619	1,466	879	187	6,087	5,280	6,010
38. Welland	1,191	737	898	1,039	1,121	275	5,197	5,261	5,142
39. Wellington	1,677	1,213	1,520	1,731	1,838	396	8,162	8,251	7,983
40. Wentworth	952	661	773	1,269	1,057	240	4,838	4,863	4,771
41. York	2,755	1,839	2,186	2,539	2,166	488	11,576	11,697	10,987
42.*Algoma District, etc.	1,748	1,036	1,224	1,158	863	131	5,713	5,837	5,535
43. N. Nipissing & W. Parry Sound	1,354	782	784	696	461	70	3,695	3,819	3,209
44 Moose Fort	10	12	18	16		6	50	49	20
Totals	66,134	44,054	55,213	58,475	54,578	12,696	282,916	284,394	274,042
Cities.									
1. Belleville	408	221	254	274	373		1,530	1,530	1,530
2. Brantford	578	328	448	767	489	47	2,657	2,657	2,657
3. Chatham	341	273	385	332	304		1,635	1,635	1,635
4. Guelph	319	228	203	505	344	141	1,740	1,740	1,740
5. Hamilton	1,386	1,201	1,227	2,254	1,650	426	8,099	8,144	8,144
6. Kingston	648	416	363	660	646		2,733	2,733	2,733
7. London	1,162	848	1,468	1,305	1,328		6,111	6,111	6,111
8. Ottawa	1,269	713	869	1,293	1,121	241	5,506	5,506	5,506
9. St. Catharines	352	285	232	370	241		1,480	1,480	1,128
10. St. Thomas	530	273	409	462	397		2,071	2,071	2,071
11. Stratford	255	214	321	381	383		1,554	1,554	1,554
12. Toronto	5,522	3,383	6,758	6,596	5,492	2,050	29,801	29,801	29,801
13. Windsor	752	495	492	398	225		2,362	2,362	2,362
Totals	13,522	8,878	13,429	15,597	12,993	2,905	67,279	67,324	66,972

SCHOOLS.—*Continued.*

various branches of instruction.

	Geography.	Music.	Grammar and Composition.	English History.	Canadian History.	Physiology and Temperance.	Drill and Calisthenics.	Bookkeeping.	Algebra.	Geometry.	Botany.	Elementary Phys'cs.	Agriculture.
1	3,222	1,443	2,215	797	1,553	1,103	1,878	202	170	161	77	56	570
2	7,506	5,468	6,574	2,735	4,606	5,227	3,657	490	515	504	187	148	1,319
3	4,437	2,473	4,222	1,661	3,224	2,192	2,328	279	269	231	48	21	1,057
4	3,109	2,115	2,365	1,561	1,936	1,906	3,424	262	229	230	52	72	1,115
5	3,665	3,124	3,251	1,048	1,495	1,667	3,082	184	201	195	77	51	853
6	3,179	1,699	2,712	801	1,172	1,077	1,096	177	188	158	79	37	600
7	5,083	3,187	4,547	2,175	3,073	3,245	3,794	496	460	436	295	104	1,702
8	5,290	2,992	4,631	1,300	2,591	6,057	4,253	175	164	155	58	40	1,083
9	3,588	1,840	2,887	1,418	1,994	1,964	2,993	84	73	64	83	7	533
10	2,903	1,036	2,582	822	1,039	1,186	1,280	112	113	86	38	.....	3,284
11	9,760	6,313	8,516	2,716	5,150	8,206	6,269	621	471	430	205	65	271
12	2,756	2,034	2,239	1,410	1,510	1,979	2,480	157	146	127	72	251	1,254
13	3,419	1,419	2,754	968	1,578	1,469	1,468	120	117	87	42	.....	280
14	2,422	1,562	2,102	1,000	1,509	1,407	1,610	188	182	159	9	....	936
15	5,285	4,093	5,012	1,602	3,036	4,452	5,621	1,042	259	253	103	33	1,154
16	8,993	6,443	8,002	3,380	5,289	3,827	4,354	838	800	793	246	157	2,528
17	6,159	5,313	5,642	2,279	2,958	3,519	4,668	468	466	463	118	115	2,126
18	6,077	5,260	6,297	2,477	3,926	4,361	5,697	382	408	402	119	58	1,664
19	2,804	1,129	2,679	1,094	1,456	1,130	2,361	144	141	140	74	74	465
20	6,495	3,724	5,968	3,007	3,735	3,301	3,827	321	284	272	59	19	2,076
21	3,063	1,432	2,975	1,407	1,829	2,102	1,861	198	125	107	38	37	1,178
22	2,854	1,564	2,547	1,300	1,663	1,546	2,248	135	60	53	109	....	705
23	7,025	6,102	5,750	2,794	3,709	5,166	5,563	518	493	471	81	11	2,540
24	4,294	3,641	3,574	1,855	2,112	2,057	3,213	281	221	209	34	3	1,415
25	4,544	2,001	4,185	1,202	1,792	1,986	1,883	271	206	197	64	21	705
26	4,752	2,810	4,736	2,034	2,756	2,268	2,824	347	298	255	18	5	1,390
27	4,999	2,876	4,522	2,157	3,102	2,629	2,685	479	477	449	87	133	1,391
28	2,870	1,804	2,488	1,220	1,802	1,354	2,492	212	202	202	.....	31	772
29	4,619	5,910	4,206	1,775	2,595	1,683	6,327	209	179	177	66	13	1,787
30	3,604	1,498	3,256	1,224	1,866	1,870	2,108	158	134	116	98	25	638
31	3,246	2,041	2,985	1,084	1,683	2,084	3,765	260	178	176	39	3	631
32	2,405	715	2,236	1,016	1,234	1,682	1,193	289	228	210	98	50	1,238
33	4,234	1,437	3,848	1,658	2,319	2,524	1,366	322	335	299	.....	39	808
34	10,080	9,093	8,460	4,585	5,958	5,754	9,503	1,055	830	769	233	217	2,745
35	3,106	869	2,594	903	1,154	1,363	1,350	152	144	139	65	50	476
36	4,728	2,232	4,366	1,749	2,505	2,106	2,430	255	248	229	160	32	879
37	4,758	3,876	3,970	706	2,005	1,600	2,677	163	144	135	39	5	470
38	3,777	1,928	3,593	1,745	2,261	2,012	1,700	292	273	244	77	20	888
39	5,629	3,370	5,076	2,370	3,667	3,073	3,511	486	367	355	62	46	1,647
40	3,473	1,948	3,275	1,455	2,047	1,630	2,126	252	235	224	43	29	1,358
41	7,982	5,832	7,649	2,758	3,710	3,378	5,346	354	388	331	182	104	1,270
42	3,693	1,977	3,199	1,213	2,082	1,799	1,970	194	105	97	24	11	654
43	2,110	1,116	1,853	636	911	766	1,191	63	63	56	51	1	202
44	26	52	26	13	13	.....	20	4	.....	.....	.....	.....	.....
	198,023	128,791	176,566	73,110	107,605	111,707	135,492	13,691	11,589	10,846	3,709	2,194	47,657
1	901	1,530	886	443	647	518	1,444	.....	....	.....	.....	.....	.....
2	2,657	2,657	1,761	636	1,145	2,657	2,657	47	.....	....	.....	.....	.....
3	1,288	1,635	1,228	327	517	403	1,635	.....	....	.....	.....	.....	.....
4	1,315	1,740	1,689	344	773	773	1,740	141	..	.....	.....	.....	.....
5	5,888	8,090	6,748	2,037	3,065	6,332	8,144	426	426	426	1,021	154	.....
6	1,838	2,733	1,814	646	961	1,620	2,733	.....	.....	.....	.....	.....	.....
7	6,111	6,111	3,090	942	2,122	6,111	6,111	....	.....	..	.....	.....	.....
8	2,655	3,272	2,655	1,362	2,655	2,655	5,506	241	241	241	.....	.....	.....
9	843	.....	843	241	483	483	.....	....	.....	.....	.....	.....	.....
10	1,268	.....	1,268	397	859	972	2,071	.....	... ..	.....	.....	.....	.....
11	1,085	1,493	1,085	383	567	1,024	1,554	...	....	... ..	...	.....	...
12	29,801	28,801	28,416	5,189	7,664	17,935	29,120	3,949	1,894	1,845	274	.....	1,831
13	1,355	2,083	1,600	225	623	2,362	1,737	.....	.....	.....	.....	.....	.....
	57,005	54,745	53,083	13,172	22,081	43,845	64,452	4,804	2,561	2,512	1,295	154	1,831

THE PUBLIC

II.—Table B—Number of pupils in the

Towns.	Reading.						Writing.	Arithmetic.	Drawing.
	1st Reader Part I.	1st Reader Part II.	2nd Reader.	3rd Reader.	4th Reader.	5th Reader.			
1 Alliston	75	40	43	46	77	79	360	360	334
2 Almonte	83	69	96	58	69	.....	375	375	375
3*Amherstburg	98	43	59	29	48	8	285	285	285
4 Arnprior	191	121	120	91	90	.....	613	613	613
5 Aurora	71	50	94	73	59	.....	347	347	347
6 Aylmer	58	66	80	114	122	.....	440	440	440
7 Barrie	255	191	277	258	227	.....	1,208	1,208	1,208
8 Berlin	204	257	397	333	217	.....	1,408	1,408	1,408
9 Blenheim	115	65	115	54	47	34	430	430	430
10 Bothwell	35	31	39	34	23	30	192	192	192
11 Bowmanville	96	76	103	110	109	.....	494	494	494
12 Bracebridge	283	130	158	151	62	36	820	820	820
13 Brampton	112	65	83	137	89	.....	486	486	486
14 Brockville	355	168	323	316	195	.... :	1,357	1,357	1,357
15 Carleton Place	220	172	125	172	168	... .	857	857	857
16 Clinton	84	80	80	145	94	.....	483	483	483
17 Cobourg	75	121	105	159	113	.....	573	573	573
18 Collingwood	342	173	256	233	289	....	1,293	1,293	1,293
19 Cornwall	136	146	128	113	124	.... ..	647	647	647
20 Deseronto	223	101	160	95	91	.....	670	670	604
21 Dresden	98	89	46	72	47	54	406	406	324
22 Dundas	130	122	55	144	86	.....	537	537	537
23 Dunnville	101	91	78	79	87	.....	436	436	436
24 Durham	80	54	66	69	54	68	391	391	358
25 Essex	100	66	65	69	55	.....	355	355	355
26 Forest	79	61	56	55	68	.....	319	319	319
27 Fort William	356	108	174	122	117	.....	877	877	877
28 Galt	284	145	307	336	311	.....	1,383	1,383	1,383
29 Gananoque	149	128	166	169	140	.....	752	752	752
30 Goderich	94	111	188	201	93	.....	687	687	482
31 Gore Bay	47	37	32	45	50	28	239	239	239
32 Gravenhurst	200	104	107	91	107	.... ..	609	609	609
33 Harriston	64	47	90	65	93	.....	359	359	359
34 Hawkesbury	23	36	32	23	34	....	148	148	148
35 Ingersoll	166	86	203	179	146	... ..	780	780	780
36 Kincardine	102	45	80	101	118	.....	446	446	446
37 Leamington	112	106	126	72	79	.....	495	495	495
38 Lindsay	246	136	236	271	216	.....	1,105	1,105	1,105
39 Listowel	167	87	92	170	135	6	657	657	657
40 Little Current	40	43	28	19	53	11	194	194	194
41 Mattawa	34	5	16	20	15	11	101	101	59
42 Meaford	133	39	83	75	65	.....	395	395	395
43 Midland	241	99	160	136	70	43	749	749	749
44 Milton	109	62	64	53	58	43	389	389	389
45 Mitchell	94	60	73	119	125	.....	471	471	471
46 Mount Forest	107	60	93	96	96	.....	457	457	457
47 Napanee	110	80	95	124	192	.....	601	601	601
48 Newmarket	104	67	92	82	70	.. .. ..	415	415	415
49 Niagara	60	16	62	59	74	.....	271	271	271
50 Niagara Falls	137	114	121	131	151	....	654	654	654
51 North Bay	227	61	66	51	55	65	460	525	510
52 North Toronto	140	77	89	96	60	11	473	473	473
53 Oakville	92	44	69	87	51	. .....	343	343	343
54 Orangeville	97	93	125	107	100	.....	527	527	527
55 Orillia	213	155	189	225	177	47	1,006	1,006	1,006
56 Ottawa	182	92	158	208	142	.....	782	782	782
57 Owen Sound	307	214	375	305	269	.....	1,470	1,470	1,470

SCHOOLS.—*Continued*

various branches of instruction.—*Continued.*

	Geography.	Music.	Grammar and Composition.	English History.	Canadian History.	Physiology and Temperance.	Drill and Calisthenics.	Bookkeeping.	Algebra.	Geometry.	Botany.	Elementary Physics	Agriculture.
1	334	77	300	250	275	275	100	53	79	79	53	35	.....
2	251	.....	191	69	96	69	.....	.....	.....	....	.....	...	.....
3	144	103	119	55	84	175	195	8	8	8	8	8	.....
4	301	432	613	90	181	422	613	....	...	....	.....	.....	..
5	347	282	347	59	132	347	282	.....	.....	...	.....	.....	.....
6	316	.....	316	80	122	122	224	...	.....	.....	.....	.....	.....
7	1,128	1,208	1,124	485	485	834	1,208	578	.....	.....	.....	.....	.....
8	947	947	550	108	383	217	1,408	.....	.....	...	.....	.....	.....
9	288	430	250	81	123	192	216	34	34	34	16	34	.....
10	126	.....	126	53	53	96	.....	30	30	30	30	30	.....
11	322	494	322	109	219	329	494	...	.....	...	...	...	.....
12	385	294	487	193	193	193	820	36	36	36	.....	36	.....
13	436	486	373	89	226	89	486	89	.....	.....	.....	...	...
14	823	1,357	1,002	348	348	511	1,357	....	.....	.....	.....	.....	.....
15	602	312	523	168	252	168	106	.. ..	.....	.. ...	.....	.....	.....
16	319	483	239	74	209	74	483	...	.. .	....	.....	....	.....
17	377	460	377	113	272	272	164	.. ....	..	.....	.....	....	.....
18	833	1,293	653	414	522	877	1,293	.....	.....	.....	.....	...	.....
19	647	647	647	124	179	647	647	.....	....	.....	.....	.....	.....
20	346	403	447	91	186	186	481	.....	.....	.....	...	...	.. ...
21	275	321	275	85	173	119	.....	54	54	54	40	...	.....
22	285	.....	285	44	230	409	471	.....	.....	.....	.....	.....	.....
23	267	144	224	70	115	224	366	...	.....	.....	.....	.....	.....
24	278	69	278	89	158	224	358	35	68	68	35	68	.....
25	255	228	355	62	124	355	355	.....	.....	.....	...	.....	.....
26	179	319	179	68	123	123	251	.....	.. .	.....	....	.....	.
27	547	388	493	119	223	323	637	.....	.....	.....	.....	.....	.....
28	1,035	1,383	1,183	268	523	843	.....	.....	...	.....	.....	.....	...
29	541	332	475	140	309	475	125	.....	.....	.....	.....	.....	.....
30	482	.....	393	200	200	93	.....	...	.....	..	...	....	.....
31	231	.....	123	115	115	127	.....	19	28	28	19	9	...
32	405	.....	509	107	198	405	.....	....	.....	.....	....	.....	....
33	309	309	309	93	158	217	267	....	.....	.....	.....	...	..
34	148	148	148	50	50	50	148	.....	.....	. .	..	.....	.....
35	780	780	528	146	156	780	780	.....	.....	.....	.....	.....	.....
36	416	347	446	118	219	269	217	66	.....	... ..	.....	.....	.....
37	404	495	353	79	151	353	.....	.....	....	.....	.....	.. ..	...
38	776	838	978	216	325	318	444	.....	.. .	.....	.....	.....	.....
39	403	657	403	141	311	141	.....	6	6	6	....	...	6
40	111	194	111	64	83	194	194	11	11	11	....	...	...
41	67	.....	46	26	46	36	.....	11	11	11	.....	8	8
42	309	395	262	65	176	176	395	.....	.....	.....	...	...	.....
43	617	749	749	113	249	706	749	43	43	8	43	.....	..
44	379	389	389	101	154	346	389	88	43	43	.....	13	30
45	317	...	317	125	188	125	471	.. .	.....	....	.....	.....	...
46	350	457	350	96	192	350	457	.....	.....	.....	.....	.....	.....
47	601	601	476	357	357	476	601	...	...	.....	....	...	...
48	415	415	311	70	122	122	415	.....	. ..	.....	....	....	.....
49	211	59	211	74	133	195	197	...	.....	....	.....	....	.....
50	403	....	340	89	208	208	340	.....	.....	.....	.....	.. ..	.....
51	288	460	233	161	161	233	525	55	65	65	.....	15	50
52	316	473	473	71	139	71	473	11	11	11	.....	.....	11
53	209	343	209	51	93	154	188	... ..	.....	.....	.....	.....	.....
54	332	365	527	207	207	332	527	...	....	..	...	...	.....
55	793	742	689	287	403	319	..	47	47	37	47	...	.....
56	517	662	504	77	142	142	280	.....	.....	...	....	....	.....
57	949	1,470	947	269	574	574	1,470	... ..	.....	...	....	...	.....

THE PUBLIC

II.—Table B.—Number of pupils in the

Towns.	Reading.						Writing.	Arithmetic.	Drawing.
	1st Reader Part I.	1st Reader Part II.	2nd Reader.	3rd Reader.	4th Reader.	5th Reader.			
58 Palmerston	127	77	63	76	82	46	465	465	465
59 Paris	128	71	84	119	91	.....	523	523	523
60 Parkhill	60	34	51	36	63	.....	244	244	244
61 Parry Sound	275	142	99	110	98	52	776	776	776
62 Pembroke	189	85	101	99	192	.....	666	666	666
63† Penetanguishene	155	128	97	102	86	22	590	590	590
64 Perth	129	64	105	139	131	.....	568	568	568
65 Peterborough	375	286	318	323	351	.....	1 653	1,653	1,653
66 Petrolea	248	140	132	211	213	.....	944	944	944
67 Picton	143	92	125	118	140	.....	618	6 8	618
68 Port Arthur	192	65	83	91	76	.....	507	507	507
69 Port Hope	157	158	185	160	170	.....	830	830	830
70 Prescott	112	79	64	49	103	.....	407	407	407
71 Preston	76	92	99	72	39	.....	378	378	378
72 Rat Portage	412	121	200	143	91	88	1,055	1,055	1,055
73 Renfrew	144	47	66	96	116	.....	469	469	469
74 Ridgtown	122	65	107	91	107	.....	492	492	492
75 St. Mary's	122	124	85	264	185	.....	780	780	657
76 Sandwich	77	53	90	66	25	.....	311	311	257
77 Sarnia	414	213	215	236	345	.....	1,423	1,423	1,423
78 Sault Ste. Marie	360	153	193	154	121	49	984	1,030	1,026
79 Seaforth	69	88	39	127	109	.....	432	432	432
80 Simcoe	88	69	113	98	122	.....	490	490	490
81 Smith's Falls	330	124	252	180	169	.....	1,055	1,055	1,055
82 Stayner	80	50	47	58	43	44	301	312	301
83 Strathroy	137	84	123	96	147	.....	587	587	587
84 Sturgeon Falls	39	20	32	47	25	3	166	166	166
85 Sudbury	75	27	37	46	44	22	229	251	251
86 Thessalon	79	37	30	33	44	15	238	238	238
87 Thornbury	44	12	30	47	29	22	184	184	184
88 Thorold	58	58	70	82	71	.....	339	339	339
89 Tilsonburg	83	49	94	108	118	.....	452	452	452
90 Toronto Junction	311	273	231	329	227	.....	1,371	1,371	1,371
91 Trenton	187	102	170	123	69	.....	651	651	651
92 Uxbridge	77	62	89	104	66	.....	398	398	398
93 Vankleek Hill	63	17	32	49	46	.....	207	207	207
94 Walkerton	126	117	57	114	115	.....	529	529	529
95 Walkerville	66	47	46	49	65	.....	207	273	273
96 Wallaceburg	129	99	108	109	74	96	553	608	553
97 Waterloo	100	105	113	188	132	.....	638	638	638
98 Welland	76	77	42	90	79	.....	364	364	364
99 Whitby	99	52	60	95	114	.....	420	420	420
100 Wiarton	122	149	98	137	74	.....	580	580	580
101 Wingham	92	61	105	119	74	63	514	514	490
102 Woodstock	403	278	340	367	285	.....	1,673	1,673	1,673
Totals	15,086	9,550	11,923	12 627	11,341	1,096	61,538	61,603	60,863
Totals.									
1 Counties, etc	66,134	44,054	55,213	58,475	54,578	12,696	282,916	284,394	274,042
2 Cities	13,522	8,878	13,429	15,597	12,993	2,905	67,279	67,324	66,972
3 Towns	15,086	9,550	11,923	12,627	11,341	1,096	61,338	61,603	60,863
4 Grand totals, 1900	94,742	62,482	80,565	86,699	78,912	16,697	411,533	413,321	401,877
5 " " 1899	96,163	63,650	82,627	88,507	80,231	18,049	420,594	423,336	406,914
6 Increases	.....	.....	.....	.....	.....	.....	.....	.....	.....
7 Decreases	1,421	1,168	2,062	1,808	1,319	1,352	9,061	10,015	5,037
8 Percentages	22	15	19	21	19	4	98	98	96

† Including Protestant Separate School.

SCHOOLS.—*Continued.*

various branches of instruction.—*Concluded*

	Geography.	Music.	Grammar and Composition.	English History.	Canadian History.	Physiology and Temperance.	Drill and Calisthenics.	Bookkeeping.	Algebra.	Geometry.	Botany.	Elementary Physics.	Agriculture.
58	338	337	338	128	204	52	198	31	46	46	46	46	.....
59	324	.....	240	91	178	523	.....	.....	.....	....	.....	.....	.....
60	184	244	98	63	98	98	.....	.....	.....	.....	.....	.....	.....
61	359	553	776	136	246	208	738	38	52	52	38	52	.....
62	666	666	666	192	291	291	666	.....	.....	.....	....	.....	.....
63	304	393	374	53	210	53	.....	19	19	19	19	.....	.....
64	375	....	316	131	219	131	568	....	.....	.....	.....	.....	.....
65	992	742	1,008	239	674	674	1,241	....	.....	.....	.....	.....	.....
66	556	944	427	213	424	944	944	.....	.....	....	.....	.....	.....
67	383	618	550	140	258	383	398	.....	....	.. ...	.....	.....	.....
68	315	507	250	76	159	130	54	.....	.....	.....	.....	.....	.....
69	515	539	611	170	248	420	420	.....	....	.....	.....	.....	.....
70	407	407	407	152	152	407	407	.....	.. .	....	.....	.....	.....
71	210	378	210	39	111	39	.....	....	.....	.....	....	..	.....
72	544	1,055	353	299	322	513	1,055	52	85	85	52	35	.....
73	394	469	394	116	218	212	212	.....	.....	.....	.....	.....	.....
74	305	385	252	107	107	107	385	.....	.....	.....	.....	.....	.....
75	534	.....	534	185	449	185	183	.....	.....	.....	.....	.....	.....
76	196	58	196	39	76	76	.. . .	1	.....	.....	.....	.....	.....
77	869	1,201	1,423	281	581	1,198	1,341	.....	.....	.....	.....	.....	.....
78	666	. .....	670	164	318	471	1,024	42	49	49	42	33	.....
79	312	272	202	109	202	105	174	.. ...	.....	.....	.....	.....	.....
80	402	490	220	122	220	490	490	.....	.....	.....	.	.....	.....
81	1,055	1,055	1,055	169	270	1,055	1,055	....	.....	.....	.....	.....	.....
82	221	149	232	58	103	79	149	7	44	44	7	37	.....
83	366	587	366	82	243	587	587	.....	.....	... ..	.....	.....	.....
84	166	....	166	75	75	75	.....	12	7	4	.....	4	3
85	112	79	191	51	112	112	79	22	22	.....	22	.....	... ..
86	238	238	104	83	92	122	....	25	15	15	15	.....	.....
87	184	184	184	51	98	184	184	22	22	22	.....	22	51
88	301	.....	301	71	153	223	.....	.....	.....	.....	.. ...	.....	.....
89	369	452	267	163	226	226	452	.....	.....	.....	....	....	.....
90	723	1,371	863	227	619	469	1,371	....	.....	....	.....	.... .	.....
91	362	400	374	69	192	149	482	.....	... ..	.....	.....	.....	.....
92	259	398	259	66	66	259	398	.....	....	.....	.....	.....	.....
93	207	207	144	46	95	95	207	.....	.....	....	.....	. ..	.... .
94	457	460	457	115	229	529	415	.....	... ..	.....	.....	.....	.....
95	207	273	207	65	114	273	47	...	.....	.. .	.....	.....	.....
96	615	615	608	245	245	387	.....	34	96	96	34	28	... ..
97	538	161	538	132	199	132	100	.....	.....	.....	.....	. ...	.....
90	300	.....	364	79	169	211	.....	.....	.....	.....	... ..	.....	.....
99	380	420	420	130	209	420	420	.....	.....	.....	.....	.. ..	.....
100	309	580	309	74	211	580	580	... ..	.....	.....	.....	.....	.....
101	312	377	366	136	186	74	.....	48	63	63	48	17	.....
102	1,170	1,673	652	285	652	482	.....	.....	.....	.....	.....	.....	.....
	48,513	44,177	43,029	13,283	22,551	31,128	39,691	1,627	1,094	1,024	614	530	159
1	198,023	128,791	176,566	73,110	107,605	111,707	135,492	13,691	11,589	10,846	3,709	2,194	47,657
2	57,005	54,745	53,083	13,172	22,081	43,845	64,452	4,804	2,561	2,512	1,295	154	1,831
3	43,513	44,177	43,029	13,283	22,551	31,128	39,691	1,627	1,094	1,024	614	530	159
4	298,541	227,713	272,678	99,565	152,237	186,680	239,635	20,122	15,244	14,382	5,618	2,878	49,647
5	301,832	216,164	278,764	103,740	151,722	195,495	237,745	22,237	16,782	15,064	6,803	4,330	42,398
6	.....	11,549	.... .	.....	515	....	1,890	.....	.....	.....	.....	.....	7,249
7	3,291	.....	6,086	4,175	.....	8,815	.....	2,115	1,538	682	1,185	1,452	.....
8	71	54	65	24	36	44	57	5	4	3	1	.68	12

THE PUBLIC

III.—Table C.—Teachers,

Counties (including incorporated villages, but not cities or towns), etc.	Number of teachers	Male.	Female.	Salaries. Highest salary paid.	Average salary, male teacher	Average salary, female teacher.
				$	$	$
1 Brant	71	26	45	575	402	295
2 Bruce	218	89	129	725	345	247
3 Carleton	137	41	96	600	359	267
4 Dufferin	103	29	74	600	317	257
5 Dundas	105	39	66	800	338	256
6 Durham	116	44	72	550	339	259
7 Elgin	134	48	86	525	368	274
8 Essex	145	61	84	675	373	274
9 Frontenac	151	24	127	450	280	223
10 Glengarry	84	17	67	550	338	245
11 Grey	259	88	171	705	340	248
12 Haldimand	94	35	59	700	345	261
13 Haliburton, N. E. Muskoka, S. Nipissing and E. Parry Sound	131	19	112	675	361	214
14 Halton	75	25	50	600	378	282
15 Hastings	203	61	142	750	350	255
16 Huron	220	101	119	750	360	264
17 Kent	153	47	106	600	382	282
18 Lambton	202	70	132	600	346	274
19 Lanark	132	23	109	600	273	232
20 Leeds and Grenville	261	56	205	700	300	231
21 Lennox and Addington	126	36	90	550	288	228
22 Lincoln	82	32	50	600	373	275
23 Middlesex	210	90	120	525	340	275
24 Norfolk	121	43	78	600	315	261
25 Northumberland	129	53	76	700	345	250
26 Ontario	139	63	76	800	354	266
27 Oxford	139	71	68	675	397	275
28 Peel	89	30	59	600	354	277
29 Perth	119	60	59	550	374	279
30 Peterborough	114	36	78	650	331	247
31 Prescott and Russell	115	33	82	700	323	226
32 Prince Edward	82	37	45	550	303	253
33 Renfrew	153	39	114	500	274	234
34 Simcoe and W. Muskoka	300	122	178	750	349	260
35 Stormont	88	29	59	450	310	240
36 Victoria and S E. Muskoka	169	58	111	500	329	235
37 Waterloo	127	65	62	700	404	261
38 Welland	105	33	72	720	382	263
39 Wellington	169	76	93	650	365	270
40 Wentworth	96	40	56	525	380	280
41 York	210	88	122	700	398	278
42 *Algoma District, etc	138	55	83	750	308	252
43 N. Nipissing and W. Parry Sound	145	35	110	575	314	228
1 Totals, counties, etc.	6,159	2,167	3,992	800	349	255
2 " cities	1,204	157	1,047	1,500	892	455
3 " towns	1,032	194	838	1,100	624	309
4 Grand totals, 1900	8,395	2,518	5,877	1,500	404	298
5 " " 1899	8,321	2,612	5,709	1,500	394	294
6 Increases	74		168		10	4
7 Decreases		94				
8 Percentages		30	70			

NOTE.—In addition there were 250 Kindergarten teachers and 21 Night School teachers.

SCHOOLS.—*Continued.*

salaries, certificates, etc.

	Number of teachers who have attended a Normal School.	Certificates.							
		Number of certificates.	Provincial 1st class.	Provincial 2nd class.	First class, old County Board.	Second class, old County Board.	Third class.	Temporary certificates.	Other certificates
1	49	71	12	38			21		
2	81	218	12	71			135		
3	81	137	8	73			56		
4	37	103	4	33			66		
5	40	105	4	36	1		64		
6	47	116	6	41			69		
7	51	134	8	51			75		
8	50	145	5	46			74	14	6
9	42	151	1	42		1	101	6	
10	27	84	2	25			57		
11	75	259	10	68	1		180		
12	34	94	8	26			60		
13	4	131	6	15	1		46	18	45
14	35	75	2	34	1		38		
15	61	203	2	60			141		
16	112	220	11	103			106		
17	69	153	3	65	1		84		
18	89	202	5	85			112		
19	28	132		28	2		101	1	
20	59	261	8	51			202		
21	26	126	3	24		2	91	6	
22	40	82	17	33	1		30	1	
23	108	210	7	102		2	99		
24	33	121	2	34		4	81		
25	59	129	3	57		1	68		
26	57	139	3	55	1		69	11	
27	58	139	11	48	1	1	78		
28	44	89	5	59			45		
29	64	119	4	60			55		
30	44	114	3	42			66	3	
31	12	115	2	11			97	5	
32	24	82	3	21			57	1	
33	21	153	2	19			122	10	
34	80	300	14	72			212	2	
35	25	88	2	24		1	61		
36	43	169	4	42			117	6	
37	68	127	10	64			52		1
38	30	105	5	26	2		72		
39	69	169	11	63	1		93	1	
40	50	96	9	43			44		
41	118	210	9	118	2		80	1	
42	19	138	8	57	1		68	4	
43	11	145	6	23			95	21	
1	2,175	6,159	260	2,068	16	12	3,640	111	52
2	1,140	1,304	189	958	14	6	30		7
3	820	1,032	126	716	16	4	149	12	9
4	4,135	8,395	575	3,742	46	22	3,819	123	68
5	3,805	8,321	506	3,499	44	29	4,187	56	
6	330	74	69	243	2			67	
7						7	368		
8	49		6.85	44.57	.55	.26	45.49	1.47	.81

THE PUBLIC

IV. Table D.—School

Totals.	School Houses.					School Visits.				
	Number of Schools open.	Brick.	Stone.	Frame.	Log.	By Inspector.	By Trustees.	By Clergymen.	By other persons.	Total.
1 Counties, etc.....	5,265	2,165	436	2,337	327	11,026	7,971	3,380	23,374	45,751
2 Cities	167	144	18	5	.....	3,389	2,362	565	12,217	18,533
3 Towns	223	165	26	32	.....	2,004	2,122	503	4,996	9,625
4 Grand totals, 1900	5,655	2,474	480	2,374	327	16,419	12,455	4,448	40,587	73,909
5 " 1899.....	5,654	2,453	484	2,372	345	16,229	14,169	4,832	45,726	80,956
6 Increases	1	21	.....	2	.....	190	.....	.....	.....	.....
7 Decreases	.....	.....	4	.....	18	.....	1,714	384	5,139	7,047
8 Percentages	.....	43.75	8.49	41.98	5.78	22	17	6	55	.....

SCHOOLS.—*Continued.*

Houses, Prayers, Etc.

	Maps and Globes.		Examinations, prizes.		Lectures.			Trees.				
	Number of maps.	Number of globes.	Number of public examinations.	Number of schools distributing prizes or merit cards.	By Inspector.	By other persons.	Total.	Number of trees planted on Arbor Day.	Number of schools using authorized Scripture Readings	Number of schools opened or closed with prayer.	Number of schools using the Bible.	Number of schools imparting religious instruction.
1	42,471	4,480	2,352	453	1,192	167	1,359	9,677	3,070	5,083	2,052	886
2	8,922	264	126	98	7	23	30	†	44	166	141	5
3	2,661	312	80	32	51	77	128	215	118	318	100	9
4	54,054	5,056	2,558	583	1,250	267	1,517	9,892	3,232	5,467	2,293	900
5	53,347	4,912	2,722	622	1,785	229	2,014	11,504	3,322	5,510	2,295	871
6	707	144	.....	.....	.....	38	.....	.....	.....	.....	.....	29
7	.....	.....	164	39	535	.....	497	1,612	90	43	2	.....
8	*f*9	*f*1	.....	10	82	16	.....	.....	57	97	41	16

† 14,270 plants and 5,690 bulbs.
f To each school.

THE PUBL C

V.—Table E.—

Counties (including incorporated villages, but not cities, or towns), etc.	Receipts. Legislative grants.	Municipal grants and assessments.	Clergy reserve fund, balances and other sources.	Total receipts for all Public School purposes.
	$ c.	$ c.	$ c.	$ c.
1 Brant	2,388 00	27,953 53	16,342 13	46,683 66
2 Bruce	7,684 00	72,000 40	32,460 43	112,144 83
3 Carleton	4,787 00	44,856 40	14,503 83	64,147 23
4 Dufferin	3,273 00	38,948 49	16,317 79	58,539 28
5 Dundas	3,337 00	56,114 39	9,979 23	49,430 62
6 Durham	3,484 00	39,351 18	15,690 03	58,525 21
7 Elgin	4,962 00	47,566 93	29,532 42	82,061 35
8 Essex	5,105 00	55,356 89	21,492 90	81,954 79
9 Frontenac	3,579 00	35,320 22	14,431 86	53,331 08
10 Glengarry	2,591 00	26,457 26	8,140 00	37,188 26
11 Grey	8,519 00	81,057 37	31,485 43	121,061 80
12 Haldimand	3,015 00	30,911 04	15,421 99	49,348 03
13 Haliburton, N. E. Muskoka, S. Nipissing, and E. Parry Sound	9,752 00	31,190 00	10,805 02	51,847 02
14 Halton	2,721 00	22,436 01	17,455 82	42,612 83
15 Hastings	7,188 00	60 359 61	21,154 52	88,702 13
16 Huron	8,103 00	79 748 91	36,923 23	124,775 14
17 Kent	6,145 00	58,962 00	47,441 46	112,548 46
18 Lambton	6,594 00	71,089 63	33,301 45	110,985 08
19 Lanark	3,983 00	34,784 35	13,014 54	51,781 89
20 Leeds and Grenville	6,724 00	73,617 08	24,341 27	104,682 35
21 Lennox and Addington	3,589 00	33,526 06	15,385 55	52,500 61
22 Lincoln	2 914 00	30,918 03	12,366 21	46,198 24
23 Middlesex	7,254 00	78 799 50	37,729 29	123,782 79
24 Norfolk	4,019 00	40,400 89	26,232 02	70 651 82
25 Northumberland	4,386 20	44,437 96	21,493 00	70,317 16
26 Ontario	5,402 00	48,431 65	22,501 74	76,335 39
27 Oxford	5,159 00	55,099 72	43,794 96	104,053 68
28 Peel	2,857 00	33,675 98	15,469 34	52,002 32
29 Perth	4,483 00	47,380 48	19,366 54	71,230 02
30 Peterborough	4,432 90	33,393 94	10,519 27	48,346 11
31 Prescott and Russell	4,151 00	34,337 31	14,019 99	52,508 30
32 Prince Edward	2,432 00	23,904 08	9,335 89	35,671 97
33 Renfrew	6,418 00	37,589 56	13,714 67	57,722 23
34 Simcoe and W. Muskoka	16,337 00	96,963 27	47,866 42	161,166 69
35 Stormont	2,617 00	26,134 39	7,056 73	35,808 12
36 Victoria and S. E. Muskoka	9,129 00	44,857 68	17,961 50	71,948 18
37 Waterloo	4,457 70	52,125 48	39,524 83	96,108 01
38 Welland	3,518 00	36,429 65	22,134 29	62,081 94
39 Wellington	6,280 00	61 371 82	34,078 78	101,730 60
40 Wentworth	3,745 00	33,053 85	29,132 22	65,932 07
41 York	7,161 00	82,694 04	44,909 80	134,764 84
42 *Algoma District, etc	16,246 00	36 992 31	20,486 27	73,724 58
43 N. Nipissing and W. Parry Sound	10,821 00	22,936 94	9 094 59	42,852 53
44 Moose Fort	150 00	.....	.....	150 00
Totals	241,893 80	2,003,636 19	964,409 25	3,209,939 24
Cities :				
1 Belleville	1,118 35	11,327 38	1,701 14	14,146 87
2 Brantford	2,299 05	24,000 00	3,204 47	29,503 52
3 Chatham	1,254 25	13 607 05	425 85	15,287 15
4 Guelph	1,303 50	18,000 00	864 24	20 167 74
5 Hamilton	6,741 60	109 990 22	30,983 95	147,715 77
6 Kingston	2,305 60	25,350 00	1,912 86	29,568 46
7 London	5,493 75	83,000 00	3,983 74	92,477 49
8 Ottawa	4,207 70	91,486 25	23,827 39	119,521 34
9 St. Catharines	1,186 00	14,252 00	645 46	16,092 46
10 St. Thomas	1,560 00	18,205 06	1,341 85	21,106 91
11 Stratford	1,435 95	14,500 00	2,125 75	18,061 70
12 Toronto	24,367 35	663,977 00	1,603 44	689,947 79
13 Windsor	1,797 00	23,165 42	1,836 47	26 798 89
Totals	55,070 10	1,110,860 38	74,465 61	1,240,396 09

*Statistics of preceding year, except Legislative grant.

SCHOOLS.—*Continued.*

Financial Statement.

	Expenditure.					Balances.
	Teachers' Salaries.	Sites and building school houses.	Maps, apparatus, prizes, libraries, etc.	Rent and repairs, fuel and other expenses.	Total expenditure for all Public School purposes.	
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	23,321 81	2,318 65	649 02	7,823 42	34,112 90	12,570 76
2	61,680 57	8,653 24	1,236 52	17,145 62	88,715 95	23,428 88
3	38,952 35	3,419 31	407 94	12,976 96	55,756 56	8,590 67
4	27,607 95	7,675 94	1,481 61	11,403 61	48,169 11	10,370 17
5	29,626 45	4,985 33	563 87	7,940 79	43,116 44	6,314 18
6	33,482 67	1,688 83	304 20	9,247 60	44,723 30	13,801 91
7	40,753 29	3,351 15	1,026 97	15,047 21	60,178 62	21,882 73
8	45,250 27	3,293 74	654 39	14,227 48	63,425 88	18,528 91
9	32,240 18	1,781 71	342 56	7,990 86	42,355 31	10,975 77
10	21,210 09	2,369 44	429 26	6,295 08	30,303 87	6,884 39
11	70,679 28	7,072 40	1,872 85	19,115 72	98,740 25	22,321 55
12	27,280 51	1,087 38	350 03	8,468 13	37,186 05	12,161 98
13	29,377 81	6,381 37	532 51	7,965 75	44,257 44	7,589 58
14	23,900 53	1,505 41	495 23	7,904 91	33,806 08	8,806 75
15	55,521 87	2,134 53	1,433 47	11,673 72	70,763 59	17,938 54
16	67,001 55	9,802 54	1,486 69	20,219 90	98,510 68	26,264 46
17	48,013 12	8,022 50	757 08	19,209 40	76,002 10	36,546 36
18	60,118 40	7,149 13	1,256 04	17,208 55	85,732 12	25,252 96
19	31,285 78	1,640 97	283 61	7,926 61	41,136 97	10,644 92
20	63,949 20	3,897 82	1,028 25	16,445 74	85,321 01	19,361 34
21	29,779 41	3,869 91	570 79	7,359 75	41,579 86	10,920 75
22	25,945 68	1,042 74	409 10	7,223 83	34,621 35	11,576 89
23	63,322 80	8,435 22	1,014 78	20,750 85	93,523 65	30,259 14
24	34,071 41	1,573 86	330 30	9,016 44	44,992 01	25 659 81
25	37,181 15	2,531 10	419 67	15,595 55	55,727 47	14,589 69
26	42,581 63	3,127 34	1,063 42	13,707 22	60 479 61	15,855 78
27	46,936 56	6,236 06	411 42	12,959 49	66,543 53	37,510 15
28	26,687 86	4,155 21	865 31	8,784 35	40,492 73	11,509 59
29	38,764 18	4,880 07	809 20	10,817 90	55,271 35	15,958 67
30	29,832 60	1,073 32	195 06	8,675 08	39,776 06	8,570 05
31	29,537 66	5,829 99	280 66	7,251 03	42,899 34	9,608 96
32	22,225 03	418 89	546 70	5,237 84	28,428 46	7,243 51
33	35,625 45	3,455 05	777 71	8,442 79	48,301 00	9,421 23
34	87,128 24	10,501 04	2,997 39	21,600 05	122,226 72	38,939 97
35	22,429 73	3,488 62	210 09	6,026 74	32,155 18	3,652 94
36	43,387 83	5,613 83	596 71	10,852 11	60,450 48	11,497 70
37	42,313 70	4,430 48	714 67	12,138 41	59,597 26	36,510 75
38	31,603 98	939 35	264 78	8,736 89	41,545 00	20,536 94
39	52,615 42	5,608 11	1,467 74	18,202 59	77,893 86	23,836 74
40	30,808 63	4,017 73	713 40	9,910 14	45.449 90	20,482 17
41	68,833 54	5,414 78	1,682 87	25,846 10	101,777 29	32,987 55
42	39,429 85	6,637 41	1,204 48	9,930 17	57,201 91	16,522 67
43	23,181 90	3,773 16	548 83	8,514 02	36,017 91	6,834 62
44	150 00	.....	.....	.....	150 00	.....
	1,735,627 92	185,284 66	34,687 18	513,816 40	2,469,416 16	740,523 08
1	9,617 14	.....	.....	3,388 56	13,005 70	1,141 17
2	19.819 16	180 95	2,172 36	7,326 16	29,498 63	4 89
3	10.242 24	.....	79 00	3,883 34	14,204 58	1,082 57
4	13,103 65	2,194 93	158 60	4,571 85	20,029 03	198 71
5	71,342 43	8,305 39	6,827 93	58.976 44	145,452 19	2,263 58
6	19,480 87	.....	2,073 99	7,893 78	29,448 64	119 82
7	61,927 05	4,104 88	.....	26, 45 56	92,477 49	.....
8	54,935 43	3,000 00	2,213 38	27,517 47	87,666 28	31,855 06
9	10,578 94	.....	7 95	5 525 57	16.092 46	.....
10	15,059 63	563 50	.....	4,850 82	20,473 95	632 96
11	11,522 75	36 30	1,440 68	5,061 97	18.061 70	.....
12	366,714 92	110,997 40	8,315 34	149,805 11	635 832 77	54,115 02
13	19,262 52	.....	75 83	7,460 54	26,798 89	.....
	683,586 73	129,383 35	23,365 06	312,707 17	1,149,042 31	91,353 78

THE PUBLIC

V.—Table E.—

Towns.	Receipts.			
	Legislative grants	Municipal grants and assessments.	Clergy reserve fund, balances, and other sources.	Total receipts for all Public School purposes.
	$ c.	$ c	$ c.	$ c.
1 Alliston	223 00	1 936 35	472 70	2,632 05
2 Almonte	281 00	3,528 87	800 28	4,610 15
3 *Amherstburg	129 00	2,314 28	366 93	2,810 21
4 Arnprior	290 00	3,819 33	1,682 44	5,791 77
5 Aurora	188 00	2,800 00	780 87	3,268 87
6 Aylmer	296 25	4,189 39	190 44	4,676 08
7 Barrie	770 00	7,654 28	2,667 52	11,091 80
8 Berlin	1,181 60	13,189 39	926 68	15,297 67
9 Blenheim	207 00	3,434 22	8,302 55	11.943 77
10 Bothwell	112 00	1,192 15	1,023 65	2,327 80
11 Bowmanville	353 00	4,500 00	203 88	5,056 88
12 Bracebridge	775 00	2,200 00	1,332 63	4.307 63
13 Brampton	517 60	4.450 00	231 40	5.198 40
14 Brockville	954 00	13,000 00	780 26	14,734 26
15 Carleton Place	508 00	5,350 00	472 52	6,330 52
16 Clinton	468 00	2,950 00	606 86	4,024 86
17 Cobourg	379 00	5.200 00	591 29	6,170 29
18 Collingwood	669 00	9,350 00	524 14	10,543 14
19 Cornwall	478 00	6,140 00	2,233 88	8,851 88
20 Deseronto	444 00	4,972 36	793 28	6,209 64
21 Dresden	200 00	3,200 00	4,809 80	8,209 80
22 Dundas	307 00	4,326 95	278 84	4,912 79
23 Dunnville	234 00	2,650 00	153 11	3,037 11
24 Durham	308 00	2,762 29	304 70	3,374 99
25 Essex	176 00	2,074 25	70 82	2,321 07
26 Forest	356 00	2,649 75	226 12	3,231 87
27 Fort William	646 00	12,024 95	3,578 99	16,199 94
28 Galt	1,048 15	13,950 00	582 79	15,580 94
29 Gananoque	566 00	5,692 77	57 49	6,316 26
30 Goderich	592 00	5,109 13	115 00	5,816 13
31 Gore Bay	523 00	760 32	1,112 53	2,395 85
32 Gravenhurst	228 00	3,650 00	77 14	3,955 14
33 Harriston	216 00	2,609 00	185 15	3,010 15
34 Hawkesbury	52 00	1,600 00	142 27	1,794 27
35 Ingersoll	681 25	6,124 38	462 52	7,268 15
36 Kincardine	412 00	3,988 00	412 46	4,812 46
37 Leamington	372 00	3,486 10	5 75	3,863 85
38 Lindsay	762 00	9,745 97	111 53	10,619 50
39 Listowel	322 00	3,278 00	67 29	3,667 29
40 Little Current	80 00	1,060 00	635 91	1,775 91
41 Mattawa	216 00	950 00	145 68	1,311 68
42 Meaford	369 00	2,815 00	149 74	3,333 74
43 Midland	300 00	9,200 00	546 76	10,046 76
44 Milton	312 00	2,384 12	945 11	3,641 23
45 Mitchell	412 00	3,000 00	220 43	3,632 43
46 Mount Forest	419 00	3,466 00	327 95	4,212 95
47 Napanee	525 00	3,660 00	956 88	5,141 88
48 Newmarket	369 00	2,675 00	610 55	3,654 55
49 Niagara	168 00	1,976 00		2,144 00
50 Niagara Falls	408 45	6,500 00	59 71	6,968 16
51 North Bay	939 00	4,825 19	2,359 39	8,183 58
52 North Toronto	259 25	4,125 00	156 51	4,540 76
53 Oakville	187 00	2,458 00	1,441 46	4,086 46
54 Orangeville	645 00	3,950 00	264 77	4,859 77
55 Orillia	459 00	8,000 00	243 81	8,702 81
56 Oshawa	461 00	6,041 00	571 10	7,073 10
57 Owen Sound	1,142 50	13,350 00	229 55	14,722 05
58 Palmerston	223 00	4,209 00	19 94	4,451 94
59 Parkhill	145 00	1,925 00	779 27	2,849 27
60 Paris	361 00	4.774 00	5,136 23	10,271 23
61 Parry Sound	865 00	4,577 42	238 27	5,680 69
62 Pembroke	347 00	4,644 83	279 44	5.271 27
63 †Penetanguishene	277 00	3,725 41	261 75	4,264 16

* Statistics of preceding year, except Legislative grant; no report received.
† Including Protestant Separate School.

SCHOOLS —*Continued.*

Financial Statement —*Continued.*

	Expenditure.					
	Teachers' salaries.	Sites and building school houses.	Maps, apparatus, prizes, and libraries.	Rent and repairs, fuel, and other expenses.	Total expenditure for all Public School purposes.	Balances.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	1,921 83		52 29	493 57	2,467 69	164 36
2	3,649 19			947 21	4,596 40	13 75
3	1,915 00		23 90	452 77	2,391 67	418 54
4	3,225 00		11 76	629 64	3,866 40	1,925 37
5	1,990 00		9 45	497 34	2,496 79	772 08
6	3,176 00	670 65	22 03	704 13	4,572 81	103 27
7	8,159 79	284 36	85 40	2,263 00	10,792 55	299 25
8	10,185 98	289 16	502 74	4,194 87	15,172 75	124 92
9	2,976 95	3,980 11	116 05	553 23	7,626 34	4,317 43
10	1,366 66	59 75	81 21	293 86	1,801 48	526 32
11	3,625 00	77 35	89 23	1,066 50	4,858 08	198 80
12	2,921 45		29 53	1,276 66	4,227 64	79 99
13	3,585 51			1,502 90	5,088 41	109 99
14	8,380 35		363 55	5,491 73	14,235 63	498 63
15	4,099 21		4 50	1,173 56	5,277 27	1,083 25
16	2,776 00		15 00	696 00	3,487 00	537 86
17	3,921 60	140 00	44 82	2 063 87	6,170 29	
18	6,777 49		124 07	3,074 79	9,976 35	566 79
19	4,546 03			1,402 77	5,948 80	2,903 08
20	4,315 30		47 14	947 70	5,310 14	899 50
21	2,653 63		38 11	472 11	3,163 85	5,045 95
22	3,816 42			907 64	4,724 06	188 73
23	2,166 00		247 25	604 92	3,018 17	18 94
24	2,431 04	321 29	36 86	582 37	3,371 56	3 43
25	1,674 31			424 32	2,098 63	222 44
26	2,365 00			687 70	3,052 70	179 17
27	5,851 19	7,560 83	214 33	2,573 59	16,199 94	
28	10,524 02	1,162 84	191 67	3,364 71	15,243 24	337 70
29	4,500 00			1,810 67	6,310 67	5 59
30	4,029 17			1,786 96	5,816 13	
31	1,465 25		29 97	357 53	1,852 75	543 10
32	2,683 25	95 42	54 70	1,121 77	3,955 14	
33	2,145 00	28 45		629 89	2,802 84	207 31
34	1,066 50			423 32	1,489 82	304 45
35	5,416 25		94 41	1,530 55	7,041 21	226 94
36	3,176 38			1,023 53	4,199 91	612 55
37	3,025 00	108 00	55 00	609 78	3,797 78	66 07
38	8,083 00			2,468 89	10,551 89	67 61
39	2,868 41		10 00	785 10	3,663 51	3 78
40	732 50		27 46	172 84	932 80	843 11
41	950 22		15 69	318 71	1,284 62	27 06
42	2,473 22			804 74	3,277 96	55 78
43	3,498 22	4,679 37	224 36	1,028 95	9,430 90	615 86
44	2,868 38	369 40	11 50	230 55	3,479 83	161 40
45	2,813 00	34 66	56 56	364 23	3,268 45	363 98
46	3,013 00		53 96	1,140 40	4,207 36	5 59
47	3,747 50		43 55	1,122 17	4,913 22	228 66
48	2,316 25			984 60	3,300 85	353 70
49	1,545 00		5 70	517 80	2,068 50	75 50
50	5,068 50	925 67	160 41	812 44	6,967 02	1 14
51	3,078 99	1,673 87	337 56	2,622 97	7,713 39	470 19
52	2,925 00	38 09	54 78	1,519 72	4,537 59	3 17
53	1,865 00			529 44	2,394 44	1,692 02
54	3,827 42		38 77	940 67	4,806 86	52 91
55	6,590 65	193 55	137 45	1,711 72	8,633 37	69 44
56	4,717 00		16 55	1,956 30	6,689 85	383 25
57	10,344 00		234 80	3,855 13	14,433 93	288 12
58	2,350 00			2,032 73	4,382 73	69 21
59	1,500 00		14 00	340 50	1,854 50	994 77
60	3,684 57	4,441 32	4 75	1,224 11	9,354 75	916 48
61	3,944 00	688 62	16 01	1,021 84	5,670 47	10 22
62	3,880 00	671 00	22 45	697 82	5,271 27	
63	2,837 00	258 50	39 31	769 39	3,904 20	359 96

THE PUBLIC

V.—Table E.—

Towns.	Receipts. Legislative grants.	Municipal grants and assessments.	Clergy reserve fund, balances, and other sources.	Total receipts for all Public School purposes.
	$ c.	$ c.	$ c.	$ c.
64 Perth	527 00	4,296 51	311 51	5,135 02
65 Peterborough	1,117 05	17,200 00	1,709 05	20,026 10
66 Petrolea	577 00	8,000 00	1,825 68	10,402 68
67 Picton	557 00	4,925 00	88 31	5,570 31
68 Port Arthur	219 00	3,890 03	48 47	4,157 50
69 Port Hope	682 00	6,659 87	437 00	7,778 87
70 Prescott	461 00	3,021 00	501 15	3,983 15
71 Preston	222 00	3,224 00	1,779 96	5,225 96
72 Rat Portage	1,006 00	16,000 00	32,924 56	49,930 56
73 Renfrew	376 00	4,890 82	256 32	5,523 14
74 Ridgetown	270 00	3,250 00	329 24	3,849 24
75 St. Mary's	418 00	3,890 00	151 71	4,459 71
76 Sandwich	174 00	2,000 00	2,164 01	4,338 01
77 Sarnia	890 00	9,372 50	1,740 51	12 003 01
78 Sault Ste. Marie	729 00	5,600 00	393 46	6,722 46
79 Seaforth	296 00	3,300 00	912 00	4,508 00
80 Simcoe	501 00	4,381 41	444 21	5,326 62
81 Smith's Falls	580 00	6,397 06	469 49	7,446 55
82 Stayner	151 00	1,805 00	612 98	2,568 98
83 Sturgeon Falls	78 00	359 35	671 99	1,109 34
84 Strathroy	527 00	4,185 00	216 51	4,928 51
85 Sudbury	207 00	1,760 65	1,097 64	3,065 29
86 Thessalon	91 00	1,327 75	216 45	1,635 20
87 Thornbury	86 00	1,827 68	316 51	2,230 19
88 Thorold	194 00	2,781 00	474 73	3,449 73
89 Tilsonburg	303 10	3,614 73	.....	3,917 83
90 Toronto Junction	976 70	13,741 00	974 40	15,692 10
91 Trenton	388 00	3,287 87	33 04	3,708 91
92 Uxbridge	214 00	2,706 37	10 77	2,931 14
93 Vankleek Hill	296 00	1,150 00	935 44	2,381 44
94 Walkerton	428 00	4,213 90	142 36	4,784 26
95 Walkerville	167 00	3,200 00	224 49	3,591 49
96 Wallaceburg	297 00	4,388 00	776 19	5,461 19
97 Waterloo	391 25	5,400 00	250 55	6,041 80
98 Welland	222 00	3,000 00	17,199 10	20,421 10
99 Whitby	398 00	4,600 00	67 39	5,065 39
100 Wiarton	252 00	2,516 47	496 19	3,264 66
101 Wingham	271 00	3,550 00	200 00	4,021 00
102 Woodstock	1,270 00	11,800 00	6,702 95	19,772 95
Totals	43,983 55	487,156 42	132,375 03	663,515 00
Totals				
1 Counties, etc	241,893 80	2,003,636 19	964,409 25	3,209,939 24
2 Cities	55,070 10	1,110,860 38	74,465 61	1,240,396 09
3 Towns	43,983 55	487,156 42	132,375 03	663,515 00
4 Grand totals, 1900	340,947 45	3,601,652 99	1,171,249 89	5,113,850 33
5 " 1899	347,251 00	3,219,601 15	1,234,711 03	4,801,563 18
6 Increases	.....	382,051 84	.....	312,287 15
7 Decreases	6,303 55	.....	63 461 14	.....
8 Percentages	7	70	23	.....
Cost per pupil.	$ c.			
1 Counties, etc	8 48			
2 Cities	17 07			
3 Towns	9 90			
4 Province	10 06			

SCHOOLS —*Concluded.*

Financial Statement.—*Concluded.*

	Expenditure.					Balances.
	Teachers' salaries.	Sites and building school houses.	Maps, apparatus, prizes, and libraries.	Rent and repairs, fuel, and other expenses.	Total expenditure for all Public School purposes.	
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
64	3,567 00	328 02	95 85	1,045 80	5,036 17	98 85
65	13,729 95			6,296 15	20,026 10	
66	5,939 70			2,985 40	8,925 10	1,477 58
67	3,879 97		148 78	1,263 44	5,292 19	278 12
68	3,111 49		14 98	1,031 03	4,157 50	
69	5,842 03			1,936 84	7,778 87	
70	2,960 70			973 35	3,934 05	49 10
71	2 640 00			876 68	3,516 68	1,709 28
72	8,938 50	900 88	763 77	39,142 04	49,745 19	185 37
73	3,105 75	676 57	2 29	1,585 21	5,369 82	153 32
74	2,782 61		4 90	515 13	3,302 64	546 60
75	3,081 61		34 20	1,303 38	4,419 19	40 52
76	1,848 50		33 00	152 62	2,034 12	2,303 89
77	8,267 80	646 67		2,129 00	11,043 47	959 54
78	4,551 89		61 82	1,904 92	6,518 63	203 83
79	2,595 00		23 60	1,375 77	3,994 37	513 63
80	4,111 00		307 35	695 40	5,113 75	212 87
81	4,831 13			2,511 04	7,342 17	104 38
82	1,963 34	65 00	6 00	512 40	2,546 74	22 24
83	690 00	50 60	115 68	253 06	1,109 34	
84	3,932 50		49 90	932 15	4,914 55	13 96
85	1,464 00			644 47	2,108 47	956 82
86	1,200 13			320 45	1,520 58	114 62
87	1,328 19			340 73	1,668 92	561 27
88	2,495 00		7 00	546 35	3,048 35	401 38
89	3,035 13		25 00	851 98	3,892 11	25 72
90	10,583 50		207 25	3,660 24	14,450 99	1,241 11
91	2,714 61		68 99	900 89	3,684 49	24 42
92	2,349 71			581 43	2,931 14	
93	1,859 50			293 11	2,152 61	228 83
94	3,458 82	4 50	5 40	1,221 32	4,690 04	94 22
95	2,472 68		27 73	987 39	3,487 80	103 69
96	3,420 00		157 02	1,710 17	5,287 19	174 00
97	4,435 00		4 50	1,305 99	5,745 49	296 31
98	2,229 20	12,900 65		796 10	15,925 95	4,495 15
99	3,841 00		27 50	1,177 38	5,045 88	19 51
100	2,340 00			672 70	3,012 70	251 96
101	3,170 00	144 40		655 06	3,969 46	51 54
102	11,240 87		969 06	3,623 57	15,833 50	3,939 45
	390,031 39	44,469 55	7,271 66	168,300 86	610,073 46	53,441 54
1	1,735,627 92	185,284 66	34,687 18	513,816 40	2,469,416 16	740,523 08
2	683,586 73	129,383 35	23,365 06	312,707 17	1,149,042 31	91,353 78
3	390,031 39	44,469 55	7,271 66	168,300 86	610,073 46	53,441 54
4	2,809,246 04	359,137 56	65,323 90	994,824 43	4,228,531 93	885,318 40
5	2,776,641 32	322,402 97	59,527 66	861,475 97	4,020,047 92	781,515 26
6	32,604 72	36,734 59	5,796 24	133,348 46	208,484 01	103,803 14
7						
8	66.44	8.49	1.54	23.53		

ROMAN CATHOLIC

I.—Table F.—Financial

Counties (including incorporated villages but not cities or towns,) etc.	Number of Schools.	Receipts.				Expendi-
		Legislative grants.	School rate on supporters.	Subscribed and from other sources.	Total amount received.	Teachers' salaries.
		$ c	$ c	$ c	$ c	$ c
1 Bruce	7	414 00	4,156 62	2,098 58	6,669 20	3 260 00
2 Carlton	15	626 00	5,915 70	1,271 93	7,813 63	4,618 42
3 Essex	10	435 00	3,615 76	1,904 67	5,955 43	3,837 29
4 Frontenac	11	426 09	3,040 06	1,112 95	4,579 01	2,642 30
5 Grey	7	442 00	1,837 11	686 72	2,965 83	1,605 00
6 Hastings	7	201 00	1.651 92	507 83	2,360 75	1 547 80
7 Huron	6	287 00	2,082 59	584 28	2,953 87	1,910 00
8 Kent	7	266 00	2,799 25	1,148 68	4,213 93	2,408 81
9 Lambton	2	64 00	575 01	195 45	834 46	510 00
10 Lanark	3	130 00	573 91	258 93	962 84	635 00
11 Leeds and Grenville	5	341 00	1,255 50	561 11	2,157 61	1,405 25
12 Lennox and Addington	2	43 00	511 84	143 44	698 28	469 57
13 Lincoln	2	69 00	1,123 54	255 11	1.447 65	850 00
14 Middlesex	4	152 00	971 04	151 03	1,274 07	897 65
15 Norfolk	1	46 00	361 34	475 07	882 41	260 00
16 Northumberland	6	254 00	1,744 01	923 55	2,921 56	1,618 00
17 Ontario	1	94 00	181 82	778 67	1,054 49	625 00
18 Peel	1	16 00	134 46	72 44	222 90	199 05
19 Perth	4	163 00	1,245 14	343 37	1,751 51	1,021 00
20 Peterborough	1	17 00	230 64	44 95	292 59	225 00
21 Prescott and Russell	66	3,119 00	21,106 18	8,677 52	32,902 70	18.355 71
22 Renfrew	10	759 09	2,296 06	3,736 17	6,791 23	2,415 88
23 Simcoe	3	238 00	1,191 08	247 52	1,676 60	1,095 00
24 Stormont, Dundas and Glengarry	11	716 00	4,634 57	3,006 52	8,357 09	4,279 13
25 Waterloo	7	325 00	3,206 01	1,979 69	5,510 70	2,825 00
26 Wellington	8	297 00	2,657 22	651 57	3,605 79	2,120 15
27 Wentworth	1	71 00	145 15	41 79	257 94	200 00
28 York	2	53 00	465 67	325 58	844 25	495 00
29 Algoma District	2	200 00	885 00	1,512 52	2,597 52	726 30
30 Nipissing "	13	1,425 00	3,004 19	954 01	5,383 20	3,219 81
Totals	225	11,689 00	73,598 39	34,651 65	119,939 04	66,177 12
Cities.						
1 Belleville	2	271 00	1,406 80	603 68	2,281 48	1,371 00
2 Brantford	2	239 00	1,560 91	465 24	2,265 15	1,100 00
3 Chatham	1	182 00	1,360 38	279 09	2,121 47	1,477 41
4 Guelph	3	266 00	2,175 63	655 74	3,097 37	1,700 00
5 Hamilton	8	980 00	11,000 00	2 411 62	14,391 62	5,219 75
6 Kingston	4	509 00	2,450 00	8,960 74	11,919 74	4,418 00
7 London	6	594 00	6,530 09	536 65	7,660 74	2,850 00
8 Ottawa	23	5,065 00	38,025 00	32,706 44	75,796 44	21,518 00
9 St. Catharines	3	236 00	4,054 26	35 99	4,325 35	1,950 00
10 St. Thomas	1	130 00	1,300 35	1 80	1,432 15	800 00
11 Stratford	1	216 00	2,297 48	40 64	2,554 12	1,300 00
12 Toronto	22	3,056 00	45.025 91	16,370 43	64,452 34	21,798 89
Totals	76	11,744 00	117,486 81	63,067 16	192,297 97	65,503 05

SEPARATE SCHOOLS.

Statement, Teachers, Etc.

ture.						Teachers.				
	Sites and building school houses.	Maps, apparatus, prizes and libraries.	All other purposes	Total amount expended.	Balances	Number of teachers.	Male	Female.	Average salary, male.	Average salary, female. (In addition, members of Religious Orders received free residence.)
	$ c	$ c	$ c	$ c	$ c					
1	1,285 24	74 50	823 67	5,443 41	1,225 79	15	3	12	373	178
2	1,407 31	108 15	1,450 36	7,484 24	329 39	21	1	20	240	217
3	242 20	39 57	1,564 07	5,683 13	272 30	17	1	16	360	208
4	101 47	3 10	828 56	3,575 43	1,003 58	11	2	9	192	239
5	15 00	110 16	433 61	2,163 77	802 06	7	....	7	....	231
6	334 46	.. ..	261 84	2,144 10	216 65	7	...	7	....	245
7	95 09	..	561 18	2,566 27	387 60	7	1	6	350	264
8	234 48	98 57	453 42	3,195 28	1,018 65	10	1	9	400	244
9	.....	28 40	92 27	630 67	203 79	2	1	1	275	235
10	4 86	.....	250 21	890 07	72 77	3	....	3	.	212
11	214 39	1 50	370 25	1,994 39	166 22	7	1	6	215	204
12	.. ...	.....	209 78	679 35	18 93	2	1	1	250	220
13	332 00	2 20	198 96	1,383 16	64 49	3	1	2	450	200
14	18 10	2 25	204 69	1,122 69	151 38	4	....	4	...	224
15	.....	23 45	166 28	419 73	432 68	1	....	1		340
16	266 44	.. ..	390 24	2,274 68	646 88	7	2	5	295	204
17	....	.....	240 20	865 20	189 29	2	1	1	400	225
18	. .....	....	23 85	222 90	....	1	.	1	....	220
19	2 50	.....	401 20	1,424 70	326 81	4	1	3	300	238
20	....	....	34 69	259 69	32 90	1	..	1	..	225
21	3,291 15	372 80	2,072 20	24,991 86	7,910 84	80	18	62	257	210
22	573 17	69 50	1,919 43	4 977 98	1,813 25	13	.....	13	....	215
23	196 70	43 51	212 87	1,548 08	128 52	6	1	5	390	152
24	1,031 53	23 35	2,080 64	7,414 65	942 44	20	2	18	350	210
25	484 01	60 38	654 40	4,023 79	1.486 91	12	1	11	425	218
26	307 36	37 50	592 16	3,057 17	548 62	10	1	9	275	208
27	1 20	....	56 74	257 94	.. ....	1	.....	1	....	200
28	17 50	10 00	116 13	638 63	205 62	2	.....	2	.....	247
29	1,544 25	29 80	193 00	2,493 35	104 17	4	..	4	..	181
30	431 28	66 69	1,052 30	4,770 08	613 12	13	5	8	280	221
	12,431 69	1,205 38	18,809 20	98,623 39	21.315 65	293	45	248	292	217
1	26 95	8 00	648 34	2,054 29	227 19	6	1	5	240	200
2	460 72	28 50	481 16	2.070 38	194 77	5	.....	5	... ..	220
3	.....	21 00	438 46	1.936 87	184 60	6	1	5	400	200
4	.... .	50 00	1,158 49	2,908 49	188 88	8	.....	8		212
5	2,971 18	881 51	3,534 28	12,606 72	1,784 90	38	...	38	....	160
6	196 80	162 91	6.589 10	11,366 81	552 93	15	1	14	900	221
7	2,250 00	441 00	1,800 59	7.341 59	319 15	18	...	18	....	158
8	32,171 56	220 00	20,971 33	74,880 86	915 58	92	6	86	600	201
9	1,288 00	....	792 16	4,080 16	295 19	9	1	8	500	181
10	...	30 00	563 52	1,393 52	38 63	4	.....	4	.....	200
11	540 60	50 00	549 37	2,439 97	114 15	6	.....	6	.....	217
12	19,284 46	2.805 23	19,002 88	62,891 46	1,560 88	97	26	71	300	200
	59,190 24	4,698 15	56,529 68	185,921 12	6,376 85	304	36	268	373	194

ROMAN CATHOLIC

I —Table F.—Financial

Towns.	No. of Schools.	Receipts. Legislative grants.	School rate on supporters.	Subscribed and from other sources.	Total amount received.	Expenditure. Teachers' Salaries.
		$ c	$ c	$ c	$ c	$ c
1 Almonte	1	103 00	702 24	1,197 65	2,002 89	800 00
2 Amherstsburg	1	147 00	1,579 80	1,856 40	3,583 20	1,110 00
3 Arnprior	2	176 00	1,749 99	890 05	2,816 04	1,423 71
4 Barrie	1	111 00	1,364 23	979 45	2,454 68	900 00
5 Berlin	1	233 00	2,458 25	893 34	3,584 59	1,190 00
6 Brockville	1	255 00	2,368 45	37 77	2,661 22	1,866 00
7 Cobourg	1	142 00	900 00	16 56	1,058 56	800 00
8 Cornwall	3	448 00	3,500 00	2,102 38	6,050 38	3,601 64
9 Dundas	1	113 00	849 00	371 52	1,333 52	600 00
10 Galt	1	58 00	467 74	106 00	631 74	325 00
11 Goderich	1	54 00	326 32	69 70	450 02	300 00
12 Hawkesbury	1	210 00	1,700 00	294 20	2,204 20	1,400 00
13 Ingersoll	1	66 00	908 48	1 08	975 56	718 75
14 Lindsay	2	193 00	2,092 00	1,357 04	3,642 04	2,054 25
15 *Mattawa	1	213 93	3,041 01	299 25	3,554 19	1,653 61
16 Newmarket	1	42 00	276 45	473 45	791 90	276 34
17 Niagara Falls	1	81 00	802 65	275 25	1,158 90	600 00
18 North Bay	2	99 00	1,400 00	1,110 59	2,609 59	1,029 40
19 Oakville	1	20 00	223 00	103 00	346 00	300 00
20 Orillia	1	104 00	1,281 46	1,225 12	2,610 58	1,360 49
21 Oshawa	1	55 00	368 59	175 00	598 59	419 00
22 Owen Sound	1	72 00	754 14	565 96	1,392 10	385 00
23 Paris	1	42 00	464 72	445 97	952 69	360 00
24 Parkhill	1	34 00	300 12	35 00	369 12	340 00
25 Pembroke	1	275 00	2,889 72	116 70	3,281 42	2,444 34
26 Perth	1	135 00	942 00	292 00	1,369 00	800 00
27 Peterborough	3	390 00	4,191 60	1,075 39	5,656 99	3,984 00
28 Picton	1	29 00	300 00	752 93	1,081 93	373 00
29 Port Arthur	1	78 00	829 66	310 15	1,217 81	840 00
30 Prescott	1	146 00	1,098 26	509 26	1,753 52	1,100 00
31 Preston	1	51 00	399 19	361 67	811 86	351 91
32 Rat Portage	2	192 00	1,700 00	318 04	2,210 04	1,000 00
33 Renfrew	2	155 00	2,077 25	857 06	3,089 31	1,616 91
34 St. Marys	1	46 00	392 55	167 31	605 86	325 00
35 Sarnia	1	102 00	1,116 76	362 65	1,581 41	925 00
36 Sault Ste. Marie	1	73 00	1,194 44	398 80	1,666 24	840 00
37 Sturgeon Falls	1	61 00	824 00	307 53	1,192 53	585 00
38 Sudbury	1	90 00	1,076 00	935 81	2,101 81	825 00
39 Thorold	1	68 00	1,761 00	664 25	1,793 25	709 00
40 Trenton	1	164 00	1,761 98	136 79	2,062 77	1,151 45
41 Vankleekhill	1	137 00	745 00	320 00	1,202 00	800 00
42 Walkerton	1	105 00	652 15	454 35	1,211 50	550 00
43 Wallaceburg	1	59 00	807 31	139 65	1,005 96	691 68
44 Waterloo	1	61 00	750 00	9 80	820 80	400 00
45 Whitby	1	32 00	220 00	100 09	352 09	265 00
Totals	54	5,520 93	54,907 51	23,471 96	83,900 40	44,351 48
Totals.						
1 Counties, etc	225	11,689 00	73,598 39	34,651 65	119,939 04	66,177 12
2 Cities	76	11,744 00	117,486 81	63,067 16	192,297 97	65,503 05
3 Towns	54	5,520 93	54,907 51	23,471 96	83,900 40	44,351 48
4 Grand totals, 1900	355	28,953 93	245,992 71	121,190 77	396,137 41	176,031 65
5 " " 1899	352	27,026 00	289,457 87	84,671 02	401,154 89	175,170 35
6 Increases	3	1,927 93		36,519 75		861 30
7 Decreases			43,465 16		5,017 48	
8 Percentages		7.31	62.10	30.59		49.10
Cost per pupil:		$ c.				
1 Counties, etc		6 39				
2 Cities		11 41				
3 Towns		6 94				
4 Provinces		8 46				

* No report received; statistics of preceding report, except legislative grant.

SEPARATE SCHOOLS —*Continued.*

Statement. Teachers, Etc.—*Concluded.*

diture. Sites and building school houses	Maps, apparatus, prizes and libraries.	All other purposes.	Total amount expended.	Balances	Teachers. Number of teachers	Male.	Female.	Average salary male.	Av. salary, female. (In addition rolls of Roll Orders read free fold(er.)
$ c.	$ c	$ c.	$ c.	$ c.					$
1 170 00	.....	930 37	1,900 57	102 52	3	1	2	400	212
2 844 45	58 75	1,491 36	3,504 56	78 64	4	....	4		250
3 500 00	.....	675 15	2 598 86	217 18	6	1	5	600	200
4 320 98	.....	1,010 74	2 231 72	222 96	4	...	4	.....	225
5 1,411 64	30 00	572 74	3,204 38	380 21	7	.....	7	.....	186
6	37 50	616 79	2.520 29	140 93	8	.....	8	.....	233
7	.....	201 67	1,001 67	56 89	4	.....	4	..	200
8	.....	2,448 74	6,050 38	.....	14	1	13	550	217
9	.....	233 54	833 54	499 98	4	.....	4	.....	200
10 99 00	18 00	174 94	616 94	14 80	1	.....	1	.....	325
11	.....	139 85	489 85	10 17	2	.....	2	.....	200
12 175 00	27 00	602 20	2,204 20	.....	7	.....	7	.....	200
13 16 20	10 00	230 61	975 56	.....	2	....	2	.....	287
14	5 25	548 15	2,607 65	1.034 39	7	1	6	550	351
15 1,030 89	144 41	564 05	3,392 96	161 23	5	1	4	550	200
16 6 00	.....	272 62	554 96	236 94	1	.....	1	.....	276
17 125 00	58 91	271 90	1,055 81	103 09	3	.....	3	.....	200
18 210 00	3 85	1,368 32	2.551 57	58 02	3	.....	3	.....	342
19	.....	46 00	346 00	.....	1	.....	1	.....	250
20 30 00	15 25	291 01	1,696 75	913 83	4	....	4	.....	350
21	.....	110 00	529 00	69 59	2	.....	2	.....	200
22 338 80	.....	171 80	895 60	496 50	2	.....	2	.....	192
23	.....	119 71	479 71	472 98	2	.....	2	.....	180
24	.....	22 00	362 00	7 12	1	.....	1	....	340
25 322 59	130 32	355 51	3,253 76	28 66	10	1	9	600	224
26 155 54	10 00	403 46	1,369 00	.....	4	....	4	...	200
27 25 15	10 00	1,366 84	5,385 99	271 00	14	1	13	900	241
28	3 75	178 67	555 42	526 51	2	....	2	.. .	185
29 78 17	..... .	262 00	1,150 17	67 64	3	.....	3	.....	300
30	....	653 52	1,753 52	.....	4	1	3	500	200
31 146 95	3 25	132 43	634 54	177 32	1	.....	1	.....	350
32 160 00	30 00	366 99	1,556 99	653 05	6	.....	6	.....	167
33	5 60	720 21	2 342 72	746 59	6	1	5	540	220
34 15 00	.....	56 27	396 27	209 59	1	.....	1	.....	325
35	.....	446 00	1,371 00	210 41	4	.....	4	.....	231
36 375 00	9 00	808 40	1,532 40	133 84	3	.....	3	.....	300
37 480 00	2 00	121 05	1,188 05	4 48	2	.....	2	.....	250
38 202 00	.....	628 94	1,655 94	445 87	3	.....	3	.....	275
39 15 86	127 21	732 69	1.575 76	217 49	3	.....	3	...	283
40 225 00	....	531 00	1.907 45	155 32	5	.....	5	.....	250
41	....	15 61	815 61	386 39	6	.....	6	.....	133
42 6 00	... .	599 92	1,155 92	55 58	4	....	4	.....	137
43	23 30	100 13	815 11	190 85	2	1	1	450	300
44 129 72	2 75	169 59	702 06	118 74	3	.....	3	.....	133
45	.....	70 50	335 50	16 39	1	...	1	..	265
7,614 94	765 10	21,273 99	74,006 51	9,893 89	177	10	167	564	233
1 12,431 69	1.205 38	18,809 20	98 623 39	21,315 65	293	45	248	292	217
2 59,199 24	4,698 15	56 529 68	185,921 12	6.376 85	304	36	268	573	194
3 7,614 94	766 10	21,273 99	74,006 51	9,893 89	177	10	167	564	233
4 79,236 87	6,669 63	96,612 87	358,551 02	37.586 39	774	91	683	354	212
5 72,922 41	5,017 76	98 901 17	352,011 69	49,143 20	764	101	663	360	208
6 6,314 46	1,651 87	.....	6,539 33	.....	10	.....	20	.....	4
7	....	2.288 30	... .	11,556 81		10	.....	6	....
8 22 10	1.86	26.94	....	.....	....	12	88	...	....

ROMAN CATHOLIC

II.—Table G — Attendance, pupils in the

Counties (including incorporated villages, but not cities or towns), etc.	Number of Pupils.	Boys.	Girls.	Average attendance.	Percentage of average to total attendance.	Reading.						Writing.	Arithmetic.
						First Reader, Part I.	First Reader, Part II.	Second Reader.	Third Reader.	Fourth Reader.	Fifth Reader.		
1 Bruce	848	439	409	577	68	201	141	170	192	144	....	848	848
2 Carleton	1,374	697	677	687	50	520	269	275	217	81	12	1,374	1,374
3 Essex	873	463	410	554	63	298	134	162	162	106	11	873	873
4 Frontenac	362	173	189	208	57	53	42	59	76	112	20	362	362
5 Grey	279	149	130	113	41	72	36	54	61	51	5	279	279
6 Hastings	271	136	135	125	46	70	35	46	55	61	4	271	271
7 Huron	376	205	171	202	54	79	36	70	84	89	18	376	376
8 Kent	498	247	251	243	49	151	75	84	100	69	19	498	498
9 Lambton	95	52	43	37	39	17	12	17	15	29	5	95	95
10 Lanark	98	50	48	50	51	28	13	19	17	21	...	98	98
11 Leeds & Grenville	211	111	100	130	62	51	26	34	26	49	25	2 1	211
12 Lennox & Add...	94	47	47	48	51	18	17	9	25	23	2	94	94
13 Lincoln	169	88	81	92	54	55	33	24	39	18	.	169	169
14 Middlesex	117	73	44	72	61	14	17	13	25	42	4	117	117
15 Norfolk	108	58	50	46	43	23	25	12	18	25	5	108	108
16 Northumberland.	233	125	108	133	57	48	44	51	33	47	10	233	233
17 Ontario	96	52	44	63	66	20	6	16	17	24	13	96	96
18 Peel	32	18	14	20	62	4	10	5	4	9	..	32	32
19 Perth	210	108	102	105	50	37	28	34	38	65	8	210	210
20 Peterborough	29	13	16	12	41	4	6	5	7	6	1	29	29
21 Prescott & Russell	5,018	2,518	2,500	2,638	53	2,178	1,047	853	631	306	3	5,018	5,018
22 Renfrew	623	308	315	302	48	174	89	101	91	126	42	623	623
23 Simcoe	212	100	112	146	69	39	38	57	40	34	4	212	212
24 Stormont, Dundas and Glengarry..	1,218	596	622	554	45	405	217	243	190	151	12	1,218	1,218
25 Waterloo	612	336	276	371	61	116	82	167	150	96	1	612	612
26 Wellington	388	198	190	242	62	87	51	65	106	71	8	388	388
27 Wentworth	29	17	12	12	41	5	4	8	4	5	3	29	29
28 York	106	50	56	57	54	38	15	35	12	6	..	106	106
29 Algoma District..	204	112	92	89	44	100	43	35	15	11	....	204	204
30 Nipissing " ..	661	309	352	283	43	383	81	88	71	34	4	661	661
Totals	15,444	7,848	7,596	8,211	53	5,288	2,672	2,811	2,521	1,911	241	15,444	15,444
Cities.													
1 Belleville	449	243	206	257	57	122	77	83	56	111	....	449	449
2 Brantford	341	170	171	238	70	107	42	69	71	52	...	341	341
3 Chatham	334	179	155	205	61	82	70	64	43	75	....	334	534
4 Guelph	394	195	199	295	75	81	62	94	85	72	..	394	394
5 Hamilton	1,666	803	863	1,158	69	407	287	278	283	330	81	1,666	1,666
6 Kingston	747	375	372	556	74	132	139	151	189	108	28	747	747
7 London	799	419	380	584	73	255	121	152	147	124	...	799	799
8 Ottawa	5,562	2,816	2,746	3,545	64	1,632	1,157	1,244	957	490	82	5,562	5,562
9 St. Catharines	351	194	157	235	67	65	41	81	84	80	...	351	351
10 St. Thomas	203	117	86	173	85	50	41	55	36	21	...	203	203
11 Stratford	311	168	143	228	73	119	56	47	42	47	...	311	311
12 Toronto	5,133	2,620	2,513	3,421	67	1,564	707	1,088	967	542	265	5,133	5,133
Totals	16,290	8,299	7,991	10,895	67	4,616	2,800	3,406	2,960	2,052	456	16,290	16,290

SEPARATE SCHOOLS.—*Continued.*

various branches of instruction, maps, etc.

	Drawing.	Geography.	Music.	Grammar and Composition.	English History.	Canadian History.	Temperance and Hygiene	Drill and Calisthenics.	Bookkeeping.	Algebra.	Geometry.	Botany.	Elementary Physics.	Agriculture.	Maps and prizes. Number of maps.	Maps and prizes. Schools giving prizes.	Number of trees planted on Arbor Day.
1	848	626	811	499	132	294	290	726	14	2	1	...	....	82	55	3	51
2	1,067	603	131	655	118	309	89	695	25	13	13	3	5	34	87	7	13
3	873	615	59	439	138	274	299	431	11	11	11	...	1	66	70	6	27
4	353	297	161	282	126	184	141	252	18	17	16	9	25	37	53	2	....
5	187	156	129	162	78	97	101	35	4	6	4	....	....	26	44	1	16
6	213	147	208	160	64	96	103	170	4	4	4	....	....	38	48	....	....
7	302	252	158	216	103	181	133	267	18	18	16	..	....	99	54	1	....
8	498	400	154	244	120	175	173	363	17	17	17	6	....	69	42	1	....
9	95	66	.....	66	34	53	53	95	5	5	5	....	....	41	19	....	14
10	98	76	....	73	24	38	58	81	....	....	....	..	....	50	26	....	....
11	200	170	90	168	86	113	89	165	18	25	25	17	10	.....	44	1	1
12	82	52	6	52	38	38	38	62	2	2	2	..	....	. .	13	....	....
13	169	99	100	99	18	57	46	169	1	....	....	....	....	.....	12	....	....
14	117	103	52	103	46	54	71	117	5	4	4	....	....	58	34	2	28
15	108	60	108	58	25	25	25	108	.....	....	..	...	..	25	4	....	....
16	233	196	28	159	62	79	53	65	14	14	12	....	....	15	44	1	....
17	96	70	.....	70	54	54	54	...	16	16	13	13	13	13	8	....	....
18	32	18	.... .	25	13	13	9	32	.....	..	...	....	...	9	8	....	....
19	210	146	.....	148	56	81	54	115	8	8	8	....	....	24	35	1	6
20	29	19	.	19	7	7	7		1	1	1	....	....	3	6	1	....
21	3,438	2,116	614	1,655	135	792	829	1,569	110	44	44	2	9	141	313	30	128
22	541	369	341	389	163	198	275	304	26	45	45	6	23	63	47	3	10
23	212	163	17	177	38	78	50	73	4	4	4	....	....	46	20	1	....
24	1,050	628	184	763	178	275	223	680	22	12	12	10	....	10	63	6	20
25	612	365	537	411	81	176	111	538	31	1	1	....	....	123	60	3	41
26	372	276	166	253	106	166	227	320	8	8	8	....	....	81	77	2	28
27	29	20	29	12	8	12	8	.....	3	3	3	....	....	8	5	....	....
28	106	50	68	59	6	6	6	106	.....	....	....	....	....	.....	14	2	...
29	86	63	.....	63	6	50	.. .	.....	1	....	....	....	....	.. ..	13	1	5
30	353	281	72	128	54	77	97	223	15	3	3	....	....	64	53	6	34
	12,609	8,502	4,223	7,607	2,117	4,052	3,712	7,761	401	283	272	66	86	1,125	1,371	81	422
1	449	327	449	327	167	167	449	449	.....	..	....	....	....	....	10	....	....
2	341	341	192	192	52	123	192	341	.....	....	....	..	....	....	15	1	....
3	334	334	334	182	75	118	118	334	.....	....	....	.	....	....	12	...	....
4	394	323	394	261	46	167	167	394	....	....	....	....	....	....	31	1	....
5	1,666	1,666	1,666	1,666	411	694	613	1,666	81	81	81	81	4	....	170	1	48
6	747	617	747	747	136	325	446	747	10	23	23	....	23	15	45	...	....
7	799	799	799	799	124	271	799	799	...	...	.	..	....	.	25	1	....
8	5,028	4,028	4,469	3,440	568	2,474	1,500	4,369	332	103	62	....	10	103	210	1	40
9	351	286	351	351	80	164	199	351	...	...	....	....	....	....	24	....	....
10	203	153	203	153	21	57	21	203	...	..	....	....	....	....	7	1	....
11	311	136	311	136	89	89	89	311			....		....	.....	23	....	....
12	2,596	2,885	4,950	2,603	1,098	1,372	771	4,961	254	265	265	106	61	....	306	....	....
	11,219	11,895	14,865	10,857	2,867	6,021	5,364	14,925	677	472	431	187	98	118	878	6	88

ROMAN CATHOLIC

II.—Table G.—Attendance, pupils in the

Towns.	Number of pupils.	Boys.	Girls	Average attendance.	Percentage of average to total attendance.	Reading.						Writing.	Arithmetic.
						First Reader, Part I.	First Reader, Part II.	Second Reader.	Third Reader.	Fourth Reader.	Fifth Reader.		
1 Almonte	158	78	80	93	59	56	11	33	28	30	..	158	158
2 Amherstburg	255	114	141	160	63	64	30	55	58	29	19	255	255
3 Arnprior	422	212	210	234	55	126	71	112	57	56	....	422	422
4 Barrie	173	98	75	118	68	38	14	40	42	39	....	173	173
5 Berlin	431	227	204	298	69	74	64	120	116	57	....	431	431
6 Brockville	408	188	220	289	71	82	74	100	80	72	...	408	408
7 Cobourg	238	122	116	147	62	80	20	51	42	45	....	238	238
8 Cornwall	948	445	503	626	66	433	233	110	87	85	....	948	948
9 Dundas	243	145	98	159	65	44	31	90	61	17	.	243	243
10 Galt	85	45	40	65	76	11	18	19	26	11	....	85	85
11 Goderich	80	35	45	62	77	16	12	14	24	14	....	80	80
12 Hawkesbury	585	322	263	342	58	290	122	104	25	44	....	585	585
13 Ingersoll	95	39	56	72	76	19	10	17	31	18	...	95	95
14 Lindsay	364	157	207	226	62	95	54	34	76	70	35	364	364
15 Mattawa	273	141	132	165	60	107	29	46	40	33	18	273	273
16 Newmarket	78	41	37	49	63	34	8	14	8	14		78	78
17 Niagara Falls	153	79	74	102	66	50	12	31	28	32	....	153	153
18 North Bay	237	128	109	139	59	86	30	32	45	44	....	237	237
19 Oakville	40	25	15	21	52	11	8	3	8	10	....	40	40
20 Orillia	250	126	124	169	68	63	34	44	46	63	....	250	250
21 Oshawa	89	37	52	60	67	22	13	15	24	15	....	89	89
22 Owen Sound	126	68	58	70	55	21	26	30	34	15	....	126	126
23 Paris	69	34	35	50	71	11	10	12	15	21	....	69	69
24 Parkhill	64	30	34	43	67	14	7	14	14	15	....	64	64
25 Pembroke	543	321	222	342	63	122	124	114	90	93	....	543	543
26 Perth	224	110	114	158	71	66	25	39	42	52	....	224	224
27 Peterborough	742	394	348	540	73	209	153	147	124	109	.	742	742
28 Picton	52	33	19	33	64	19	5	7	7	14	...	52	52
29 Port Arthur	197	94	103	102	52	62	32	28	27	48	....	197	197
30 Prescott	234	133	101	154	66	33	40	46	46	69	....	234	234
31 Preston	79	44	35	58	73	7	12	16	28	16	....	79	79
32 Rat Portage	281	135	146	209	74	74	51	86	48	22	..	281	281
33 Renfrew	360	176	184	219	61	124	60	56	54	66	...	360	360
34 St. Mary's	70	34	36	44	63	19	5	16	16	14	....	70	70
35 Sarnia	199	80	119	133	67	42	17	48	54	38	....	199	199
36 Sault Ste. Marie	177	100	77	88	50	70	21	31	32	23	....	177	177
37 Sturgeon Falls	253	134	119	107	42	142	56	31	24	..	..	253	253
38 Sudbury	247	115	132	119	48	144	12	28	42	19	2	247	247
39 Thorold	117	46	71	73	62	36	10	9	27	35	....	117	117
40 Trenton	253	107	146	169	67	70	63	43	58	19	..	253	253
41 Vankleekhill	243	101	142	117	48	61	52	32	59	39	....	243	243
42 Walkerton	205	102	103	158	77	40	18	45	46	56	..	205	205
43 Wallaceburg	161	79	82	75	47	48	37	29	15	32	....	161	161
44 Waterloo	121	72	49	82	68	17	16	51	24	13	....	121	121
45 Whitby	41	22	19	30	73	10	2	12	11	6	....	41	41
Totals	10,663	5,368	5,295	6,769	63	3,262	1,752	2,054	1,889	1,632	74	10,663	10,663
Totals.													
1 Counties, etc	15,444	7,848	7,596	8,211	53	5,288	2,672	2,811	2,521	1,911	241	15,444	15,444
2 Cities	16,290	8,299	7,991	10,895	67	4,616	2,800	3,406	2,960	2,052	456	16,290	16,290
3 Towns	10,663	5,368	5,295	6,769	63	3,262	1,752	2,054	1,889	1,632	74	10,663	10,663
4 Grand totals, 1900	42,397	21,515	20,882	25,875	61	13,166	7,224	8,271	7,370	5,595	771	42,397	42,397
5 " 1899	41,796	21,377	20,419	25,767	62	.....	.....	.....	.....	.....	....	41,418	41,484
6 Increases	601	138	463	108	...	....	....	.....	.....	...	...	979	913
7 Decreases	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	...	....	.....
8 Percentages	....	50.75	49.25	.....	....	31	17	20	17	13	2	100	100

SEPARATE SCHOOLS.—*Concluded.*

various branches of instruction, maps, etc.—*Concluded.*

	Drawing.	Geography.	Music.	Grammar and Composition.	English History.	Canadian History.	Temperance and Hygiene.	Drill and Calisthenics.	Bookkeeping.	Algebra.	Geometry.	Botany.	Elementary Physics.	Agriculture.	Maps and prizes. Number of maps.	Maps and prizes. Schools giving prizes.	No. of trees planted on Arbor Day.
1	158	91	.....	91	30	58	30	..	.....	....	...	.	....	....	18	...	....
2	255	255	255	161	48	106	48	255	19	19	19	19	....	.....	17	1	.. .
3	422	225	422	222	56	56	56	422	.. .	...	....	..	....	.....	12	1	....
4	173	173	173	121	39	81	81	173	....	....	..	..	...	....	16	1	...
5	431	293	431	293	57	173	57	431	...	....	..	....	....	.....	23	1	....
6	408	370	400	370	110	152	110	408	... .	..	..	....	....	....	35	1	..
7	238	138	238	138	45	60	60	..	....	..	.	..	..	....	9	. .	....
8	948	515	948	948	172	172	85	513	....	..	....	...	....	.....	18	....	...
9	243	243	243	78	78	78	243	..	...	....	..	....	....	..	13	....	....
10	74	56	85	74	11	25	11	85	....	..	....	...	....	.. ...	6	...	...
11	80	80	80	38	38	38	52	80	.....	....	....	....	....	.....	8	1	....
12	435	435	501	435	69	194	130	585	30	..	....	....	..	.....	8	....	....
13	95	76	95	41	41	41	41	95	.....	....	....	....	....	.....	5	....	....
14	364	327	364	364	101	113	203	364	.....	35	38	..	35	....	18	1	....
15	166	137	273	137	33	73	33	...	18	18	18	....	....	18	26	....	....
16	78	36	3	36	14	14	14	78	.....	....	..	....	....	.... .	8	....	....
17	153	103	153	91	32	60	91	153	.....	..	....	....	....	.....	14	....	....
18	237	237	120	120	44	89	44	..	....	....	....	....	....	. ..	12	..	....
19	40	29	21	21	10	18	10	40	.....	....	....	....	....	.....	5	1	....
20	250	187	250	109	63	109	109	250	.....	..	....	....	....	...	11	....	....
21	67	54	67	54	15	39	15	.....	....	...	....	....	....	.. ...	5	...	....
22	126	126	126	126	49	49	126	126	....	....	....	....	....	.....	8	1	....
23	69	69	69	58	21	36	69	69	....	....	....	....	....	21	7	1	....
24	64	43	64	64	15	15	15	64	.. .	..	...	....	....	.....	9	....	....
25	543	297	....	376	93	183	93	... .	.....	....	....	....	...	.....	27	1	....
26	224	224	224	133	52	94	52	130	.. ...	..	....	....	....	.....	2	...	....
27	742	438	742	464	109	230	394	742	....	....	....	....	....	....	42	....	....
28	52	28	52	28	14	10	6	..	....	..	..	....	....	.....	7	....	....
29	197	197	197	197	48	103	103	197	....	....	....	....	....	....	12	1	....
30	234	201	188	201	53	115	115	234	.....	....	....	....	....	...	14	....	....
31	79	60	79	60	16	44	44	79	.....	..	....	...	....	....	5	1	....
32	281	207	281	155	156	156	207	281	...	....	....	....	....	....	10	1	....
33	360	186	90	186	64	91	91	..	....	....	....	....	....	.....	22	1	....
34	70	70	.....	46	30	30	30	.	....	...	..	....	....	.....	6	....	....
35	199	157	....	92	38	92	38	199	....	....	....	....	....	.....	18	1	....
36	177	107	....	177	23	55	23	..	....	....	....	....	....	....	10	1	....
37	253	24	..	24	..	24	3	..	....	....	....	....	....	....	7	1	....
38	247	118	247	247	21	63	63	247	2	2	2	....	....	.....	8	....	....
39	117	117	117	117	35	48	117	117	.....	....	....	..	....	....	6	...	....
40	253	120	253	120	19	77	77	253	.....	....	....	....	....	...	12	...	....
41	243	243	243	243	36	36	36	243	36	10	10	....	....	.....	13	...	....
42	205	205	205	205	56	102	205	205	....	..	....	....	....	....	20	1	4
43	161	112	107	112	...	.....	..	19	.....	....	....	....	.	.....	8	1	....
44	121	88	121	88	24	37	37	121	.....	....	....	...	....	.....	11	1	....
45	41	29		29	17	17	6	.....	.....	....	....	...	...	....	9	....	....
	10,373	7,526	8,526	7,491	2,099	3,456	3,473	7,258	105	84	87	19	35	39	580	21	4
1	12,609	8,502	4,223	7,607	2,117	4,052	3,712	7,761	401	283	272	66	86	1,225	1,371	81	422
2	11,219	11 895	14,865	10,857	2.867	6,021	5,364	14,925	677	472	43	187	98	118	878	6	88
3	10,373	7,526	8,526	7,491	2,099	3,456	3,473	7,258	105	84	87	19	35	39	580	21	4
4	34,201	27,923	27,614	25,955	7,083	13,529	12,549	29,944	1,183	839	790	272	219	1,382	2,829	108	514
5	37,572	29,352	26,455	27,493	6,767	13,291	13,692	29,052	1,038	777	683	374	176	1,018	2,912	156	351
6	.....		1,159		316	238	... .	892	145	62	107	....	43	364	....	...	163
7	3,371	1,429		1,538	....	...	1,143	..	....	...	.	102	....	.....	83	48	....
8	81	66	65	61	17	32	30	71	3	2	2	.64	.52	3	....	30	....

COLLEGIATE INSTITUTES

I.—Table H —

Collegiate Institutes.	Receipts.						Teachers' salaries.
	Legislative grants.	Municipal grants (county).	Municipal grants (local).	School fees.	Balances and other sources.	Total receipts.	
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1 Aylmer	948 31	1,431 08	1,250 00	718 00	1,381 69	5,729 08	3 721 00
2 Barrie	1,079 30	1,937 99	2,100 00	1,612 50	1,248 49	7,978 28	5,833 31
3 Brantford	1,317 23	....	7,500 00	2,231 65	.	11,048 88	8,700 00
4 Brockville	1,125 40	3,039 00	3,500 00	587 00	2,126 20	10,377 60	6,700 04
5 Chatham	1,297 03	1,214 51	5,638 33	1,295 55	472 27	9,917 69	7,700 00
6 Clinton	978 22	1,686 20	1,200 00	856 25	633 28	5,353 95	4,525 00
7 Cobourg	900 72	900 72	3,000 00	797 50	5,982 96	11,581 84	4,981 45
8 Collingwood	947 28	897 28	2,300 00	828 50	7 00	4,980 06	3,770 27
9 Galt	1,248 17	1,994 49	3,750 00	1,901 15	286 66	9,180 47	7,292 00
10 Goderich	1,094 19	1,094 19	2,800 00	1,522 90	1,493 31	8,004 59	5,098 90
11 Guelph	1,136 84	.....	6,000 00	511 00	922 43	8,570 27	5,900 00
12 Hamilton	1,3-8 03	.....	21,269 78	3,640 75	3,474 00	29,772 56	16,438 00
13 Ingersoll	995 44	957 44	2,814 31	693 75	253 43	5,714 37	4,770 00
14 Kingston	2,721 07	.....	7,150 00	3,692 00	856 82	14,419 89	10,816 00
15 Lindsay	1,225 04	1,836 16	3,006 93	1,497 75	164 01	7,729 89	5,974 00
16 London	1,419 34	1,200 00	23,046 04	3,663 00	395 90	29,724 28	21,592 33
17 Morrisburg	1,090 20	2,220 67	2,189 57	360 00	2,967 29	8,827 73	5,000 00
18 Napanee	1,075 43	5,700 00	2,750 00	116 00	1,052 04	10,693 47	5,200 53
19 Niagara Falls	1,046 05	1,800 00	4,500 00	..	2,130 72	9,476 77	5,671 00
20 Orillia	903 05	903 05	1,400 00	936 00	7,667 89	11,839 99	4,185 77
21 Ottawa	1,301 30	.....	9,320 00	6,982 89	1,700 17	19,304 36	15,590 00
22 Owen Sound	1,249 34	1,199 34	5,900 00	2,128 50	1,453 51	11,930 69	8,770 00
23 Perth	972 85	1,207 35	2,493 60	527 00	830 22	6,031 02	4,531 00
24 Peterborough	1,280 30	.. ....	6,800 00	2,132 50	252 73	10.465 53	7,436 00
25 Ridgetown	992 92	1,943 60	1,480 00	1,023 75	1,686 54	7,126 81	4,335 83
26 Sarnia	1,066 16	2,077 26	3,700 00	95 00	1,472 85	8,411 27	5.250 00
27 Seaforth	990 19	1,711 05	1,800 00	1,195 40	1,289 10	6,985 74	4,792 67
28 Stratford	1,180 95	1,300 00	6,000 00	1,796 50	491 09	10,768 54	7,349 97
29 Strathroy	953 92	1,978 24	2,300 00	1,008 00	133 28	6.373 44	4,904 00
30 St. Catharines	1,206 30	1,766 21	5,480 00	53 00	131 23	8,636 74	7,174 60
31 St. Marys	922 21	800 00	2,450 00	1,316 50	189 19	5,677 90	4,450 00
32 St. Thomas	1,326 26	1,491 06	5,794 94	1,082 00	135 00	9,829 26	7,960 00
33 Toronto (Harbord)	1,358 96	.....	15,167 67	6,804 00	55 83	23,386 46	17,288 00
34 " (Jameson)	1,333 02	.....	15,167 67	3,761 00	55 83	20,317 52	13.666 00
35 " (Jarvis)	1,345 09	. ...	15,167 67	4,982 30	70 83	21,565 89	16,420 00
36 Whitby	820 90	1,338 28	2,400 00	416 15	201 72	5,177 05	4,131 37
37 Windsor	1,194 53	1,418 60	6,264 08	.... .	119 56	8,996 77	6,660 58
38 Woodstock	1,203 09	2,015 35	3,200 00	1,760 97	1,204 59	9,384 00	7,050 00
Totals	44,634 63	49,059 12	218,050 59	64,556 71	44,989 60	421,290 65	291,629 62

AND HIGH SCHOOLS.

Financial Statement.

	Expenditure.					Balances.	Charges per year.
	Buildings, sites, and all permanent improvements.	Repairs to school accommodations.	Library, scientific apparatus, maps, etc., drawing models, or equipment for physical education.	School books, stationery, prizes, fuel, examinations and all other expenses.	Total expenditure.		
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
1	37 74	.....	10 00	1,960 34	5,729 08	.... .	Res. $5 Form I; others $10.
2	.....	123 99	88 95	1,165 73	7,211 98	765 30	$10.
3	.....	367 53	.. ...	1,596 05	10,663 64	385 24	Res. $10; non-r. $16.
4	989 84	29 63	81 62	1,568 04	9,369 17	1,008 43	Co. $5; others $10.
5	397 92	.. . ..	259 75	1,396 76	9,754 43	163 26	City $6; Co. $10
6	.....	47 92	62 37	602 95	5,238 24	115 71	$5; $8; $10.
7	.....	35 90	55 76	6,383 90	11,457 01	124 83	Res. $12; non-r. $14; Co. $7.50.
8	103 41	56 72	26 22	383 09	4,339 71	640 35	Town $7.50; others $10.
9	120 25	120 68	64 35	1,501 96	9,102 24	78 23	Co. $10; others $14.
10	....	69 22	41 45	719 51	5,929 08	2,075 51	Res. $5, $7, $10; Co. $6, $8, $10; non-r. $8, $10 $12.
11	392 25	177 50	226 46	1,811 14	8,507 35	62 92	$20.
12	150 00	60 09	281 97	12,842 50	29,772 56	....	Res. F. I $2.50; non-r. $20; others $10.
13	.....	144 03	5 98	786 46	5 706 47	7 90	$7.50.
14	....	458 20	1,947 49	1,598 20	13,919 89	500 00	$5; $10; $15; $25.
15	47 38	42 25	136 17	1,506 08	7,705 88	24 01	Res. $10; non-r. $20.
16	.....	574 86	383 55	7,017 34	29,568 08	156 20	F. I. city, free; city and Co. $10; others, $30.
17	84 67	37 85	111 68	830 62	6,064 82	2,762 91	Town, free; others $6.
18	.... ..	274 28	4 75	1,225 32	6,704 88	3,988 59	Co. free; others $10
19	74 20	537 44	17 80	1,365 04	7,665 48	1,811 29	Free.
20	4,120 76	136 61	1,377 25	1,137 14	10,957 53	882 46	Res. $5; non-r. $10
21	1 00	76 15	35 98	3,476 55	19,179 68	124 68	F. I and II, res. $20; non-r. $30; F. III and IV, res. $25; non-r. $35.
22	84 15	172 23	233 84	1,407 40	10,667 62	1,263 07	F. I, free; res. $8 to $12; Co. $10; non-r. $10 to $15.
23	.....	.....	.....	1,186 95	5,717 95	313 07	Co. $10; non-r. $16.
24	1,100 00	.....	....	1,602 74	10,138 74	326 79	$5; $10; $25.
25	59 33	.....	.....	2,681 59	7,076 75	50 06	Res. $6; non-r. $10; Co. $ 0.
26	.....	... .	... .	2,259 82	7,509 82	901 45	Free.
27	....	5 65	121 54	824 56	5,744 37	1,241 37	F. I. $6; F. II, $8; F. III and IV, $10.
28	403 77	....	569 72	1,744 06	10,067 52	701 02	$10.
29	.....	57 35	123 15	913 45	5,997 95	375 49	F. I, town free; others $10.
30	.... ..	.... .	.....	1,349 14	8,523 74	113 00	Res. free; others $16.
31	135 73	67 76	20 00	931 00	5,604 49	73 41	Res. $5; Co. $10; non-r. $15.
32	193 84	318 56	57 15	1,299 71	9,849 26	.....	Res. F. I and II free; F. III and IV $10; Co. $10; non-r. $30.
33	.....	238 83	123 53	5,716 56	23,366 92	}	$6 to $32
34	.....	560 53	78 32	4,910 77	19,215 62	} 70 08	F. I $6 to $16; F. II $23; F. III and IV, $32.
35	... .	522 63	174 41	5,500 21	22,617 25		$6 to $23.
36	.....	230 75	26 05	712 51	5,100 48	76 57	Town $6; Co. $6 75; others $10.
37	227 25	590 23	... .	1,518 71	8,996 77	....	Free.
38	124 60	61 36	96 00	1,178 74	8,510 70	873 30	Town and Co. $7.50; others $10.
	8,848 09	6,196 79	5,943 26	86,615 39	399,233 15	22,057 50	6 free; 32 fee.

COLLEGIATE INSTITUTES

I —Table H.—

High Schools.	Receipts.						Teachers' salaries.
	Legislative grants	Municipal grants (county)	Municipal grants (local)	School fees	Balances and other sources	Total receipts.	
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1 Alexandria	630 95	630 95	1,781 00	.....	1,172 69	4,215 59	2 650 00
2 Almonte	692 46	692 46	2,250 00	312 00	355 92	4,302 84	3,350 89
3 Arnprior	594 26	594 26	1,800 00	109 70	730 99	3,829 21	2,395 00
4 Arthur	600 87	825 87	600 00	686 65	222 72	2,936 11	2,095 20
5 Athens	672 42	965 85	1,100 00	333 60	871 22	3 942 49	2,716 36
6 Aurora	610 00	700 00	750 00	580 00	403 54	3,043 54	2,150 00
7 Beamsville	482 41	527 38	350 00	....	941 00	2,300 79	1,350 00
8 Belleville	784 89	435 00	3,676 73	268 50	....	5,165 12	4,366 72
9 Berlin	802 56	2,193 19	1,153 01	980 50	1,173 49	6,302 75	3,900 00
10 Bowmanville	766 78	766 78	2,329 00	400 00	449 54	4,712 10	3,676 19
11 Bradford	589 99	814 41	500 00	478 00	1,502 48	3,884 88	2,095 00
12 Brampton	828 81	1,758 21	1,400 00	1,219 00	294 18	5,500 20	4,640 00
13 Brighton	454 10	454 10	1,200 00	69 75	708 25	2,886 20	1,599 96
14 Caledonia	582 55	1,082 55	900 00	384 25	965 75	3,915 10	2,249 97
15 Campbellford	678 92	678 92	1,924 60	420 00	1,624 06	5,326 50	3,133 35
16 Carleton Place	669 90	669 90	3,150 00	259 00	407 66	5,156 46	3,200 00
17 Cayuga	567 44	1,269 39	550 00	267 00	450 45	3,104 28	2,295 00
18 Colborne	451 96	901 48	1,000 00	68 25	1,563 82	3,985 51	1,525 00
19 Cornwall	810 45	1,671 54	3,456 40	107 00	2,773 46	8,818 85	4,916 58
20 Deseronto	611 14	611 14	2,100 00	179 25	589 19	4,090 72	2,563 44
21 Dundas	697 14	300 00	589 83	587 00	967 44	3,141 41	2,639 38
22 Dunnville	609 80	1,558 57	.....	315 00	627 97	3,111 34	2,514 80
23 Dutton	542 49	283 38	725 00	801 10	1,063 76	3,415 73	2,341 25
24 Elora	558 82	749 82	850 00	506 00	64 74	2,729 38	2,200 00
25 Essex	663 15	...	1,900 00	3 32	762 91	3,329 38	2,450 00
26 Fergus	579 02	579 02	1,300 00	117 00	640 30	3,215 34	2,300 00
27 Forest	597 56	1,281 09	500 00	272 00	881 87	3,532 52	2,035 00
28 Fort William	500 00	.....	2,539 06	.....	....	3,039 06	1,466 61
29 Gananoque	6 2 05	852 05	1,207 23	122 50	992 02	3 895 85	2,400 00
30 Georgetown	618 57	676 43	1,866 55	585 00	....	3,246 55	2,200 00
31 Glencoe	646 19	974 84	800 00	621 00	90 27	3,132 30	2,360 00
32 Gravenhurst	974 18	.....	1,012 27	490 50	335 83	2,812 78	1,908 65
33 Grimsby	424 25	555 53	608 20	36 00	78 16	1,702 14	1,300 00
34 Hagersville	623 55	1,237 05	500 00	239 75	851 56	3,451 91	2,250 00
35 Harriston	674 31	674 31	1,500 00	797 00	626 01	4,271 63	2,667 45
36 Hawkesbury	572 27	1,247 27	1,100 00	40 00	235 82	3,195 36	2,180 75
37 Iroquois	707 90	1,429 36	1,583 60	494 00	1,189 45	5,404 31	3,039 12
38 Kemptville	693 53	200 00	1,550 32	1,013 00	143 00	3,599 85	2,811 00
39 Kincardine	772 93	1,451 00	850 00	883 50	809 29	4,766 72	3,400 00
40 Leamington	668 03	1,255 19	2,000 00	53 25	305 15	4 281 62	3,119 75
41 Listowel	627 81	800 00	800 00	726 00	182 18	3,135 99	2,950 00
42 Lucan	628 12	970 50	400 00	766 00	410 96	3,175 58	2,550 00
43 Madoc	506 50	506 50	500 00	503 00	532 56	2,548 56	1,937 92
44 Markham	692 60	1,292 56	375 00	1,125 00	465 18	3,950 34	3,120 00
45 Meaford	802 34	1,465 88	1,625 00	752 00	....	4,645 22	2,914 27
46 Mitchell	647 36	799 60	1,250 00	531 66	645 33	3,873 95	2,650 00
47 Mount Forest	709 49	809 49	1,400 00	694 25	727 06	4,340 29	2,853 52
48 Newburgh	531 28	1,650 00	380 00	.....	376 61	2,937 89	2,120 04
49 Newcastle	465 22	465 22	1,000 00	87 00	142 00	2,159 44	1,225 00
50 Newmarket	629 99	700 00	1,100 00	724 00	331 14	3,485 13	2,136 79
51 Niagara	439 43	485 97	550 00	.....	188 84	1,664 24	1 250 00
52 Niagara Falls South	594 51	594 51	2,208 78	25 00	4 14	3,425 94	2,224 00
53 Norwood	637 68	705 92	.....	607 00	2,600 16	4,550 76	2,200 00
54 Oakville	480 22	578 11	856 00	230 75	855 25	3,000 33	1,800 00

AND HIGH SCHOOLS.—*Continued.*

Financial Statement.—*Continued.*

	Expenditure.					Balances.	Charges per year.
	Buildings, sites, and all permanent improvements.	Repairs to school accommodations.	Library, scientific apparatus, maps, etc., drawing models, or equipment for physical education.	School books, stationery, prizes, fuel, examinations and all other expenses	Total expenditure.		
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
1	.....	....	75 75	447 55	3,173 30	1,042 29	Free.
2	.....	8 15	....	785 33	4,145 28	157 56	Res. $1; others $11.
3	.....	.....	8 60	353 63	2,757 23	1,071 98	Res. free; non-res. $10.
4	103 40	45 05	82 56	537 94	2,864 16	71 95	$10.
5	.....	82 19	37 69	969 91	3,806 15	136 34	$5.
6	.....	21 25	57 54	404 63	2,633 42	410 12	$10
7	120 00	6 06	308 68	414 58	2,199 32	101 47	Free.
8	136 00	70 22	12 97	579 21	5,165 12	.....	$25.
9	.....	239 04	447 22	935 21	5,521 47	781 28	$10; non-res. $15.
10	.....	23 95	25 00	830 96	4,556 10	156 00	F. I $0; F. II $0; F. III & IV $75.
11	.....	.....	.....	1,776 18	3,871 18	13 70	F. I, free to res.; others $10.
12	17 75	4 20	52 34	704 91	5,419 20	81 00	$10
13	.....	456 85	.....	323 91	2 385 72	500 48	Co 75c. per mo
14	52 23	23 25	.....	535 05	2,860 50	1,054 67	$4.50.
15	.....	.....	18 70	2,174 45	5,326 50	.....	Res. $6; Co. $7 50; non-res. $10.
16	329 80	312 88	.....	547 92	4,390 60	765 86	Res. free; others $10.
17	.....	119 32	7 13	680 49	3 101 94	2 24	$4.50.
18	.....	129 55	60 43	327 54	2 042 52	1,942 99	$7.50.
19	.....	.....	...	900 98	5,817 56	3,001 29	Free.
20	150 00	76 36	43 43	855 49	3,688 72	402 00	Res. free; others $10.
21	.....	35 40	27 07	432 34	3,134 24	7 17	$9.50; $10.
22	50 76	28 69	26 10	491 29	3,111 34	.....	$1.50.
23	357 28	53 41	...	423 57	3,175 31	240 42	$10.
24	64 99	6 10	25 00	320 01	2 616 10	113 28	Res. 5; others $10.
25	303 75	76 26	8 65	368 96	3.212 62	116 76	Res. free; non-res. $10.
26	82 83	18 94	18 79	794 78	3,215 31	..	Res. free; others $10.
27	134 77	133 40	....	490 50	2.793 67	738 85	$ 0.
28	558 00	15 00	262 73	174 48	2,476 82	562 24	Free.
29	.....	564 64	43 72	817 49	3,825 85	.....	$5.
30	.....	.....	17 45	1,029 10	3,246 55	.....	F. I, $7; others $10.
31	221 56	12 95	45 78	426 84	3,067 13	65 17	Res. and Co., $10; others $20.
32	38 65	.....	.....	667 98	2 615 28	197 50	$10.
33	.....	14 12	3 20	173 87	1,491 19	210 95	Res. and Co. free; others $12.
34	.....	99 09	.....	413 75	2,762 84	689 07	$4.50.
35	.....	3 70	35 00	1,434 26	4,140 41	131 22	F. I, free to res.; others $10.
36	.....	100 90	65 81	310 75	2,658 21	537 15	Free.
37	.....	.....	32 05	831 93	3,903 19	1,501 21	$6.
38	.....	38 00	50 81	700 90	3,599 85	...	Res. free; Co. $5; others $15.
39	491 37	....	45 05	562 98	4,502 40	264 32	Res. $8; Co. $10.
40	25 75	86 21	27 75	261 54	3 521 0	760 6	Co. free; non-res. $10.
41	.....	30 00	40 00	497 54	2,917 54	218 45	Town and Co. $10; others $12.
42	.....	32 50	57 1	519 12	3,158 73	16 8	$ 0.
43	.....	255 20	.....	222 34	2,415 46	133 10	Res. $7; Co. $10.
44	.....	111 56	.....	521 86	3,753 42	196 9	$10.
45	.....	133 46	.. ..	1,586 52	4,634 25	10 97	Town $8; Co. $10.
46	270 00	42 00	411 45	4 6 5	3.800 00	73 9	Res. $6; non-res. $10.
47	.....	93 83	.....	1,173 68	4.121 03	219 6	$10
48	.....	20 92	52 55	372 07	2 565 58	372 31	Free.
49	.....	31 80	20 00	341 05	1,6 7 85	541 59	Res. free; non-res. $7.50
50	34 65	41 84	111 08	569 97	2,894 33	590 8	$10.
51	139 60	.....	37 82	1 0 6	1,598 07	66 17	Free
52	.....	45 37	57 45	670 99	2,997 8	429 13	Free.
53	.....	.....	.....	2,180 70	4,380 70	170 6	Res. and Co. $5; non-res. $15.
54	.....	.....	25 00	267 33	2,092 33	908 00	$5; $8.

COLLEGIATE INSTITUTES

I —Table H —

High Schools.	Receipts.						Teachers' salaries.
	Legislative grants.	Municipal grants (county).	Municipal grants (local).	School fees.	Balances and other sources.	Total receipts.	
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
55 Omemee	444 86	444 86	477 10	280 25	45 65	1,692 72	1,400 00
56 Orangeville	732 14	1,050 00	1,784 00	1,332 00	226 19	5,124 33	4,192 00
57 Oshawa	702 70	702 70	2,809 00	791 20	333 62	5,339 22	4,000 00
58 Paris	627 58	627 58	2,200 00	162 50	70 87	3,688 53	3,025 00
59 Parkhill	579 14	579 14	850 00	516 75	876 95	3,401 98	1,950 00
60 Pembroke	666 13	681 05	2,391 17		2,358 42	6,096 77	3,330 00
61 Petrolea	788 00	1,241 15	2,600 00	61 00	1,678 45	6,368 60	4,000 00
62 Picton	829 48	1,903 50	2,800 00		388 35	5,921 33	4,550 00
63 Port Arthur	1,066 64		1,508 32		121 40	2,696 36	2,116 65
64 Port Dover	458 29	477 33	637 38		113 32	1,686 32	1,369 15
65 Port Elgin	597 83	710 75	1,150 00	440 00	92 25	2,990 83	2,550 00
66 Port Hope	811 85	1,361 56	1,872 01	971 10	95 87	5,112 39	4,263 33
67 Port Perry	718 79	1,102 40	1,496 47	380 50	312 21	4,010 37	3,325 00
68 Port Rowan	417 07	638 41	341 21	34 00		1,430 69	1,219 75
69 Prescott	610 99	400 00	2,079 00	69 00	153 92	3,312 91	2,226 60
70 Renfrew	687 96	957 90	1,996 79		633 46	4,276 11	3,515 00
71 Richmond Hill	474 05	784 56	150 00	525 50	403 71	2,337 82	1,500 00
72 Simcoe	779 04	1,910 73	1,598 78	10 00	63 00	4,361 55	3,500 00
73 Smith's Falls	673 98	673 98	2,172 39	265 00		3,785 35	3,180 00
74 Smithville	508 99	464 24	900 00	199 00	65 91	2,138 14	1,700 00
75 Stirling	461 93	1,920 27	1,780 00	585 94	884 55	4,732 69	1,650 00
76 Streetsville	451 68	913 56	250 63	195 00	427 26	2,238 13	1,430 00
77 Sydenham	563 39	1,600 00		435 00	163 02	2,761 41	2,335 37
78 Thorold	588 57	587 57	1,600 00	33 00	991 82	3,800 96	2,240 00
79 Tilsonburg	606 82	590 89	1,500 00	498 50	55 15	3,251 29	2,110 74
80 Toronto Junction	903 92	835 58	2,965 00	1,615 50	1,324 21	7,644 21	5,220 00
81 Trenton	614 23	223 03	1,486 34	175 00	577 73	3,076 33	2,500 00
82 Uxbridge	630 12	748 93	1,365 44	358 90	84 20	3,187 59	2,638 06
83 Vankleekhill	810 32	1,951 32	1,200 00	158 00	1,369 93	5,680 57	2,622 32
84 Vienna	472 77	472 77	500 00		408 21	1,853 75	1,217 53
85 Walkerton	756 28	1,213 52	1,500 00	790 00	710 63	4,970 43	3,625 00
86 Wardsville	434 74	434 74	390 00	245 75	261 46	1,766 69	1,316 67
87 Waterdown	496 87	896 87	450 00	199 00	47 00	2,089 74	1,950 00
88 Waterford	601 96	1,331 87	700 00	54 00	515 35	3,203 18	2,038 37
89 Watford	669 88	1,747 65		352 00	2,543 02	5,312 55	2,660 00
90 Welland	664 98	1,510 16	1,650 00		366 91	4,192 05	2,980 00
91 Weston	456 54	700 00	700 00	235 00	165 77	2,257 31	1,854 15
92 Wiarton	579 62	781 10	1,000 00	330 00	323 98	3,014 70	2,166 48
93 Williamstown	583 09	583 09	1,124 72		4,425 82	6,716 72	2,365 00
1 Totals, High Schools	58,565 37	80,227 24	118,873 33	34,168 82	59,206 94	351,041 70	237,615 74
2 Totals, Coll. Institutes	44,634 63	49,059 12	218,050 59	64,556 71	44,989 60	421,290 65	291,629 62
3 Grand totals, 1900	*103,200 00	129,286 36	336,923 92	98,725 53	104,196 54	772,332 35	529,245 36
4 Grand totals, 1899	103,700 00	135,626 98	322,176 37	100,708 30	115,131 68	777,343 33	528,614 19
5 Increases			14,747 55				631 17
6 Decreases		6,340 62		1,982 77	10,935 14	5,010 98	
7 Percentages	13 33	16.75	43.65	12.78	13.49		73.65
8 Cost per pupil	$33 08						

*In addition Brantford Technical School Board received $1,000, and Hamilton Collegiate Institute Board $3,000 re Normal College.

AND HIGH SCHOOLS.—*Continued.*

Financial Statement.—*Concluded.*

	Expenditure.						Charges per year.
	Buildings, sites, and all permanent improvements.	Repairs to school accommodations.	Library, scientific apparatus, maps, etc., drawing models, or equipment for physical education.	School books, stationery, prizes, fuel, examinations and all other expenses.	Total expenditure.	Balances.	
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
55	47 18	.....	.....	212 14	1 659 32	33 40	Res. $5; non-res. $10.
56	.....	117 99	26 55	692 06	5,028 60	95 73	Town $9; others $10.
57	.....	182 33	22 40	964 10	5,168 83	170 39	$7.50.
58	.....	3 45	24 31	549 45	3,602 21	86 32	Free; non-res. $1 per mo.
59	111 17	86 06	72 33	449 58	2,669 14	732 84	$5; $8; $10.
60	1,870 49	.....	180 68	715 60	6,096 77	.....	Free.
61	.....	181 36	.....	465 51	4,646 87	1,721 73	Free.
62	42 50	82 53	109 34	1,136 96	5,921 33	.....	Free.
63	184 42	.....	....	394 39	2,695 46	90	Free.
64	.....	.....	100 60	216 57	1,686 32	.....	Free.
65	40 23	.....	14 14	315 91	2,920 28	70 55	Res F. I, $3 50, F. II & III; $6.50; others $10.
66	34 20	.....	75 19	739 67	5,112 39	.....	Res. $9; non-res. $7.50.
67	150 00	43 54	57 99	433 84	4,010 37	.....	Res. and Co. $7.50; others $10.
68	.....	.....	21 00	189 94	1,430 69	.....	Free.
69	205 69	75 18	3 25	790 48	3,301 20	11 71	Res. free; non-res. $5.
70	.....	31 45	75 59	654 07	4,276 11	.....	Free.
71	85 56	.....	38 70	344 68	1,965 94	368 88	$10.
72	.....	24 50	90 42	746 63	4,361 55	.....	Res. and Co. free; others $1 per mo.
73	.....	11 39	75 00	518 96	3,785 35	.....	Town free; others $10.
74	36 13	.....	46 05	242 35	2,024 53	113 61	Free; F. IV, $2 per mo.
75	26 59	3 75	.....	2,562 50	4,242 84	489 85	$10.
76	93 15	22 36	57 51	241 96	1,844 98	393 15	$5.
77	36 32	.....	10 15	365 90	2,747 44	13 97	50c. per month.
78	.....	46 87	5 59	925 04	3,217 41	583 55	Free.
79	31 22	18 51	59 84	576 83	2,797 14	454 15	First year free to res.; $5.
80	.....	378 98	72 22	1,147 28	6,918 48	725 73	$10; $15.
81	.....	30 12	52 00	332 43	2,914 55	161 78	$15.
82	36 75	27 63	.....	485 15	3,187 59	.....	Res. $5; non-res. $7.50.
83	1,479 50	3 65	.....	1,264 01	5,369 48	311 09	$10.
84	.....	11 15	1 94	202 88	1,433 50	420 25	Free.
85	494 80	.....	97 45	382 73	4,599 98	370 45	$10.
86	.....	7 43	24 48	402 50	1,751 08	15 61	Res $7.50; Co. $10; others $15.
87	.....	4 50	5 50	129 74	2,089 74	.....	$5.
88	.....	69 60	2 25	419 69	2,529 91	673 27	Free; non-res. $36.
89	.....	276 70	.....	1,385 84	4,322 54	990 01	$10.
90	.....	301 47	47 85	552 70	3,882 02	310 03	Free.
91	59 00	77 34	.....	213 65	2,204 14	58 17	$10.
92	41 03	106 14	30 10	393 22	2,736 97	277 73	Res. $5; others $10.
93	2,588 64	.....	94 01	1,422 44	6,470 09	246 63	Free.
1	11,385 71	5,969 60	4,379 80	69,017 63	319,368 48	31,673 22	34 Free; 59 fee.
2	8,848 09	6,196 79	5,943 25	86,615 39	399,233 15	22,057 50	6 Free; 32 fee.
3	20,233 80	12,166 39	10,323 06	146,633 02	718,601 63	53,730 72	40 Free; 91 fee.
4	†43,212 58	.....	7,753 50	142,658 91	722,239 18	55,104 15	46 Free; 84 fee.
5	.....	.....	2,569 56	3,974 11	.....	.....	7 Fee.
6	.....	.....	.....	.....	3,637 55	1,378 43	6 Free.
7	2.82	1.69	1.44	2.04	.....	.....	
8	.....	.....	.....	.....	.....	.....	

†Including repairs.

COLLEGIATE INSTITUTES

II.—Table I.—Attendance, Pupils in the

Collegiate Institutes.	Pupils and attendance.				Number of pupils in the						
	Boys.	Girls.	Total.	Average attendance.	Reading.	English Grammar and Rhetoric.	English Composition.	Poetical Literature.	Supplementary Reading in English Literature.	Canadian History.	English History.
1 Aylmer	66	75	141	89	96	134	140	140	140	123	140
2 Barrie	148	126	274	158	177	208	272	272	248	180	192
3 Brantford	165	184	349	201	260	247	345	330	330	247	277
4 Brockville	150	169	319	204	228	278	319	319	319	228	253
5 Chatham	157	189	346	204	250	290	346	300	300	250	250
6 Clinton	85	80	165	100	104	165	165	165	91	94	80
7 Cobourg	51	71	122	75	97	122	122	122	122	122	122
8 Collingwood	62	96	158	86	106	158	158	158	158	97	108
9 Galt	123	103	226	143	164	186	226	220	2 0	163	171
10 Goderich	136	124	260	169	175	175	256	256	256	175	175
11 Guelph	118	113	231	147	139	231	231	231	23	129	201
12 Hamilton	286	377	663	391	295	413	659	663	665	346	463
13 Ingersoll	84	69	153	89	126	13	150	150	150	127	130
14 Kingston	174	256	430	267	281	379	430	430	430	307	240
15 Lindsay	138	117	255	143	83	202	255	255	255	170	177
16 London	407	409	816	505	586	669	802	802	802	586	641
17 Morrisburg	98	90	188	118	64	160	188	180	180	87	180
18 Napanee	109	119	228	140	156	178	223	228	223	155	170
19 Niagara Falls	115	131	246	138	175	215	246	246	71	175	197
20 Orillia	104	123	227	133	204	201	227	227	227	197	214
21 Ottawa	236	190	426	269	311	324	426	426	426	290	311
22 Owen Sound	184	193	377	215	377	201	377	377	377	171	227
23 Perth	98	118	216	134	146	176	216	216	216	143	175
24 Peterborough	140	134	274	185	176	252	262	262	262	176	176
25 Ridgetown	83	103	186	113	110	160	186	186	180	110	180
26 Sarnia	132	120	252	143	205	207	252	252	248	205	217
27 Seaforth	87	99	186	116	110	140	186	186	186	110	120
28 Stratford	142	158	300	183	230	210	300	300	300	230	297
29 Strathroy	94	88	182	113	169	152	175	175	182	127	135
30 St. Catharines	127	174	301	171	208	266	301	301	301	217	217
31 St. Marys	85	126	211	130	159	166	211	211	211	116	139
32 St. Thomas	195	204	399	242	293	318	399	399	399	293	322
33 Toronto (Harbord)	257	256	513	304	351	328	511	466	466	288	308
34 Toronto (Jameson)	181	163	344	205	265	279	344	344	344	183	341
35 Toronto (Jarvis)	237	204	441	233	171	219	270	269	265	181	193
36 Whitby	69	93	162	100	119	125	162	162	162	119	130
37 Windsor	140	163	303	180	234	226	303	226	19	240	260
38 Woodstock	141	161	302	168	194	219	302	302	302	194	225
Totals	5,404	5,768	11,172	6,704	7,594	8,712	10,943	10,749	10,432	7,362	8,354

AND HIGH SCHOOLS —*Continued.*

various subjects, and examination results.

various branches of instruction.

	Ancient History.	Geography.	Arithmetic and Mensuration.	Algebra.	Geometry.	Trigonometry.	Physics.	Chemistry.	Botany.	Zoology.	Latin.	Greek	French.	German.	Writing.
1	51	123	130	140	106	11	106	53	74	3	132	2	84	32	87
2	123	109	217	270	230	17	167	119	81	2	229	7	137	20	100
3	119	198	267	321	316	26	158	100	153	5	249	19	254	89	186
4	91	198	278	312	174	25	209	65	142	4	280	13	260	96	138
5	96	140	300	200	187	10	226	138	88	1	259	29	227	24	150
6	74	71	139	165	142	17	81	36	72	2	130	15	127	28	49
7	25	80	103	122	9[illegible]	8	42	25	80	.....	122	4	122	33	80
8	92	88	120	158	131	6	74	45	81	2	133	5	22	13	27
9	55	130	182	223	223	8	72	46	57	.....	148	5	67	71	127
10	106	115	175	248	162	22	154	95	161	5	195	6	125	27	88
11	95	110	139	201	144	27	116	60	72	6	172	5	155	92	57
12	317	292	478	650	475	93	351	189	172	23	616	17	377	253	234
13	31	105	129	150	105	7	62	22	91	6	109	.....	102	24	81
14	111	184	349	350	160	10	69	68	67	3	355	14	327	115	132
15	105	83	20[illegible]	202	150	10	128	124	83	....	245	18	220	20	83
16	170	580	669	630	439	43	399	140	202	11	627	15	501	57	350
17	101	64	160	180	146	18	150	65	69	2	180	7	148	32	52
18	73	128	181	224	220	11	85	70	92	3	203	1	168	38	89
19	71	170	215	246	194	17	95	31	125	5	191	19	97	19	156
20	103	184	211	227	169	16	112	60	123	3	203	7	159	50	97
21	85	306	338	411	326	27	135	77	114	6	354	40	360	94	226
22	206	171	201	365	285	56	206	156	182	30	312	13	235	34	92
23	66	143	169	216	151	12	66	45	83	2	195	12	119	20	99
24	84	176	262	270	156	14	56	51	210	2	183	7	125	38	126
25	76	110	170	180	126	16	74	48	44	4	115	10	43	20	110
26	63	170	207	252	112	10	92	25	70	.....	195	27	146	27	104
27	90	110	140	186	150	14	104	104	60	.....	180	12	75	20	60
28	111	210	210	290	206	20	165	85	196	5	241	13	93	89	175
29	48	95	135	170	120	11	105	48	80	7	160	12	120	35	65
30	84	217	266	301	208	15	45	39	93	4	202	12	202	75	93
31	102	109	166	208	201	26	136	33	77	4	204	17	157	32	81
32	106	293	318	399	243	29	139	78	171	4	237	4	198	60	83
33	207	257	333	455	449	78	190	96	249	11	398	48	427	164	116
34	68	210	279	340	251	17	124	57	138	7	285	28	228	89	112
35	91	129	207	254	227	20	138	64	67	6	248	8	226	57	84
36	43	100	125	162	112	8	50	28	92	4	151	4	29	7	93
37	60	230	267	245	146	16	80	50	176	6	185	3	100	40	115
38	108	120	219	302	213	33	188	67	186	10	233	24	147	86	89
	3,707	6,308	8,656	10,225	7,650	824	4,953	2,702	4,373	198	8,856	502	6,709	2,130	4,286

COLLEGIATE INSTITUTES

II.—Table I.—Attendance, Pupils in the various

Collegiate Institutes.	Number of pupils in the various branches of instruction.—*Con*										
	Bookkeeping and Commercial Transactions.	Stenography.	Typewriting.	Drawing.	Temperance and Hygiene.	Vocal Music.	Drill, Calisthenics and Gymnastics.	Agriculture.	Manual Training.	Number passed Junior Leaving Pt I. Exam.	Number of Honors obtained by such pupils.
1 Aylmer	87	12	.....	87	.....	....	130	.....	.....	15	.....
2 Barrie	110	59	32	107	.....	.....	271	.....	....	45	.....
3 Brantford	180	90	71	154	.....	.....	299	....	19	27	.....
4 Brockville	138	.....	.....	142	.....	....	.....	.....	.....	27	....
5 Chatham	150	59	54	88	.....	.....	340	.....	.....	43	.....
6 Clinton	69	20	.....	69	.....	.....	159	.....	....	30	.....
7 Cobourg	80	.....	.....	80	.....	.....	.....	.....	.....	9	.....
8 Collingwood	74	32	....	73	.....	.....	153	...	....	8	.....
9 Galt	127	67	30	104	.....	.....	213	....	.....	24	.....
10 Goderich	110	15	.....	110	.....	.....	240	.....	.....	29	.....
11 Guelph	87	110	71	57	....	.....	225	.....	.....	24	.....
12 Hamilton	234	44	....	236	.....	....	540	.....	....	63	.....
13 Ingersoll	96	16	.....	94	....	.....	146	.....	.....	3	.....
14 Kingston	146	81	81	114	.....	....	.....	.....	49	14	.....
15 Lindsay	83	35	....	83	....	.....	240	.....	.....	32	.....
16 London	350	166	166	290	....	.....	804	....	...	73	.....
17 Morrisburg	60	65	.....	100	.....	....	188	.....	.....	43	.....
18 Napanee	89	50	....	89	.....	.....	213	....	.....	30	.....
19 Niagara Falls	144	103	.....	160	.....	.....	.....	....	...	32	.....
20 Orillia	97	90	50	97	.....	.....	211	....	....	34	....
21 Ottawa	226	116	.....	226	....	.....	388	.....	.....	18	.....
22 Owen Sound	125	30	20	110	...	....	321	....	.....	41	1
23 Perth	78	.....	.....	120	.....	.....	193	.....	.....	18	.....
24 Peterborough	126	....	....	126	...	.....	260	.....	.....	26	.....
25 Ridgetown	119	20	.....	110	.....	....	176	....	.....	18	1
26 Sarnia	145	.....	.....	104	.....	.....	180	.....	.....	21	.....
27 Seaforth	60	.....	.....	60	....	.....	164	....	.....	27	.....
28 Stratford	173	68	58	175	.....	.....	295	....	.....	28	.....
29 Strathroy	75	35	.....	75	.....	.....	175	.....	.....	40	.....
30 St. Catharines	157	99	.....	99	....	.	288	....	.....	27	.....
31 St. Marys	81	34	31	73	.....	110	211	.....	.....	53	.....
32 St. Thomas	229	61	.....	229	....	....	370	....		28	.....
33 Toronto (Harbord)	262	121	54	222	.....	.....	469	....	.....	23	.....
34 Toronto (Jameson)	118	45	....	121	.....	.....	304	.....	.....	16	.....
35 Toronto (Jarvis)	103	30	36	84	.....	....	256	....	.....	14	.....
36 Whitby	93	55	20	93	.....	...	162	.....	.....	7	....
37 Windsor	230	70	70	190	.....	.....	292	.....	.....	33	1
38 Woodstock	147	37	25	139	.....	.....	254	.....	.....	23	.....
Totals	5,058	1,935	869	4,690	....	110	9,130	.....	68	1,066	3

AND HIGH SCHOOLS.—*Continued.*

subjects, and examination results.—*Continued.*

Examination Results.

	Number passed Junior Leaving Pt. II Exam.	Number of Honors obtained by such pupils.	Number passed Commercial Diploma Exam. Pts. I and II.	Number passed Commercial Diploma Exam. Pt. II.	Number passed Senior Leaving Pt. I Exam.	Number of Honors obtained by such pupils	Number passed Senior Leaving Pt. II. Exam.	Number of Honors obtained by such pupils.	Number passed Departmental Matriculation Exam.	Number passed the Junior Matriculation Exam. held by any University.	Number of first-class Junior Matriculation Honors taken by pupils.	Number of second-class Junior Matriculation Honors taken by pupils.	Number passed the Senior Matriculation Exam. held by any University.	Number of first-class Senior Matriculation Honors taken by pupils	Number of second-class Senior Matriculation Honors taken by pupils.	Number passed the Entrance Exam. other than the Departmental, for any profession.
1	14				2				4	4	5	3				
2	29				5		1		15			4				
3	12		2	4	10		6		14	1						2
4	11				5		11		1	2			7			3
5	17		1	1	5		3		9		11	14				
6	13				5		6			1	5	9				2
7	13				2		3									1
8	10			2			1		3	2	3					
9	18	3			3		4		18	1	2	3				
10	22				6		1		11	1	6	1	2			
11	14	1	2		9		5		41	1	1	1				
12	24				22	2	24	1	72	79	44	61				7
13	7				3		6		7							1
14	16		1		1	2	1	3	17	11			7	21	8	
15	19		1		1		1		25		2	1				4
16	37		10		21	1	9	1	23		9	7				1
17	27				5		4		24	2	12		3			3
18	15				4		4		3	2	5	3				
19	10	4	3		4		7		10	1	4	12				1
20	20				2		3						2		6	
21	17				13	1	7		9	19	9	10				6
22	51		2		16		13		31	41	14	16	1	3	1	5
23	27				2		7		2	2						1
24	13				5		3		17		2					3
25	19						2		9				3	6	7	
26	8				3		3		6	3	6	11				
27	17				3		3		2	4	1	1				4
28	27	1	1		3		7		6							
29	16				1		3			2	5	4				
30	8				2				13	15	6	3	1			3
31	11				5		8		12		16	21				
32	26				8	1	7	1	1	1						10
33	12	2			6	1	8	1	16	1	33	5				2
34	20				1	3	2	8	6	8	27	6				
35	11				1		1		12	7	8	14				
36	5				4				2							1
37	3		1		2		3		9				2			4
38	20				6		3		4		11	1				3
	659	14	28		197	11	180	15	454	211	247	211	28	30	22	66

COLLEGIATE INSTITUTES

II.—Table I.—Attendance Pupils in the

High Schools.	Pupils and Attendance.				Number of pupils			
	Boys.	Girls.	Total.	Average attendance.	Reading.	English Grammar and Rhetoric.	English Composition.	Poetical Literature.
1 Alexandria	45	68	113	60	113	94	113	113
2 Almonte	67	57	124	73	99	124	124	120
3 Arnprior	47	67	114	67	95	108	114	114
4 Arthur	53	44	97	67	63	87	97	97
5 Athens	67	89	156	100	111	124	156	156
6 Aurora	56	36	92	58	92	60	92	92
7 Beamsville	40	27	67	39	59	59	67	67
8 Belleville	105	140	245	147	185	150	185	185
9 Berlin	87	77	164	89	142	136	162	162
10 Bowmanville	63	56	119	70	81	85	117	117
11 Bradford	42	45	87	52	66	67	87	87
12 Brampton	109	88	197	126	99	169	197	197
13 Brighton	28	24	52	32	33	33	52	52
14 Caledonia	44	49	93	63	77	77	93	93
15 Campbellford	53	54	107	60	75	80	107	107
16 Carleton Place	62	81	143	87	109	120	143	143
17 Cayuga	51	39	90	51	51	81	87	87
18 Colborne	39	33	72	37	37	44	72	72
19 Cornwall	97	97	194	110	194	180	194	194
20 Deseronto	40	73	113	65	70	70	113	113
21 Dundas	65	60	125	78	81	85	125	125
22 Dunnville	57	58	115	67	95	100	115	115
23 Dutton	54	62	116	76	74	110	116	110
24 Elora	52	45	97	56	67	69	97	97
25 Essex	39	46	85	54	62	62	85	85
26 Fergus	37	67	104	60	104	104	104	104
27 Forest	53	57	110	58	72	90	110	110
28 Fort William	8	25	33	26	26	29	29	32
29 Gananoque	44	76	120	75	93	93	120	120
30 Georgetown	48	49	97	57	71	72	96	96
31 Glencoe	51	39	90	56	55	55	86	86
32 Gravenhurst	23	27	50	31	29	47	47	50
33 Grimsby	17	30	47	26	37	38	47	47
34 Hagersville	33	39	72	43	48	49	72	72
35 Harriston	60	62	122	68	54	73	122	122
36 Hawkesbury	31	40	71	41	50	60	71	71
37 Iroquois	64	52	116	71	93	93	110	110
38 Kemptville	98	89	187	110	92	121	187	187
39 Kincardine	64	73	137	88	93	73	137	137
40 Leamington	62	71	133	76	92	119	133	133
41 Listowel	57	79	136	72	123	104	135	135
42 Lucan	61	50	111	76	63	63	111	111
43 Madoc	41	43	84	53	61	65	84	84
44 Markham	111	69	180	103	85	110	180	180
45 Meaford	63	57	120	76	58	95	120	120
46 Mitchell	56	44	100	63	78	86	100	100
47 Mount Forest	90	78	168	95	100	161	168	168
48 Newburgh	74	72	146	87	146	132	146	146
49 Newcastle	30	11	41	25	20	41	41	41
50 Newmarket	57	58	115	67	69	70	115	115
51 Niagara	18	23	41	22	38	38	41	41
52 Niagara Falls South	42	42	84	40	73	73	84	84
53 Norwood	50	50	100	60	100	83	98	61
54 Oakville	23	38	61	38	51	61	61	61

AND HIGH SCHOOLS.—*Continued.*

various subjects, and examination results —*Continued.*

in the various branches of instruction.

	Supplementary Reading in English Literature.	Canadian History.	English History.	Ancient History.	Geography.	Arithmetic and Mensuration.	Algebra.	Geometry.	Trigonometry.	Physics.	Chemistry.
1	113	94	94	30	57	94	113	68	.....	49	20
2	124	98	97	41	92	108	123	60	3	50	13
3	114	95	97	39	114	108	114	114	3	63	20
4	97	43	68	49	68	87	97	78	13	78	49
5	156	125	114	85	54	125	156	132	8	120	92
6	92	60	60	38	32	60	92	92	6	60	32
7	67	59	59	13	39	59	67	40	.....	40	7
8	185	131	137	54	67	141	185	185	6	149	69
9	162	53	145	38	81	142	163	118	2	72	30
10	117	81	81	38	81	85	117	83	13	71	35
11	87	67	67	30	66	66	87	65	.....	23	26
12	197	99	99	75	99	169	197	160	18	91	74
13	52	33	33	19	33	52	52	32	.....	23	19
14	40	77	77	16	47	77	93	93	.....	74	41
15	107	75	75	42	65	80	100	75	4	50	37
16	143	109	114	34	109	120	143	65	5	62	16
17	87	51	56	35	51	81	83	86	5	50	16
18	37	19	37	35	19	44	72	53	.....	....	35
19	45	120	88	80	120	180	184	184	12	85	36
20	70	70	72	45	58	82	113	113	2	43	28
21	79	85	85	40	81	85	120	80	1	65	35
22	115	97	98	34	67	100	110	68	5	24	16
23	116	74	80	36	30	96	110	80	10	86	29
24	97	20	74	45	57	68	94	72	9	44	33
25	85	57	65	42	36	62	85	69	8	54	31
26	104	70	70	34	70	104	104	62	.... ..	50	34
27	110	72	72	38	72	90	110	110	.. ..	60	29
28	32	26	26	5	25	28	32	32	.....	13	5
29	120	93	93	37	59	93	120	84	2	58	20
30	96	71	79	39	41	72	96	96	8	61	27
31	86	54	65	40	39	51	86	66	12	63	32
32	50	29	29	21	29	47	50	41	.... ..	17	21
33	47	37	37	11	37	38	47	26	1	28	10
34	72	49	51	27	48	49	72	57	3	48	24
35	54	54	68	58	48	73	122	100	9	65	43
36	71	60	47	21	50	60	71	35	6	47	11
37	110	92	95	46	54	93	108	88	3	47	29
38	176	100	116	86	52	121	187	157	16	125	68
39	137	93	93	64	73	93	129	89	14	92	30
40	133	92	98	41	82	119	133	85	7	45	24
41	135	123	123	69	123	104	135	135	1	71	64
42	111	63	63	48	63	85	111	68	5	68	42
43	84	61	61	23	84	65	84	84	.....	38	42
44	180	85	115	95	85	105	180	180	20	137	93
45	120	56	56	62	56	95	118	87	10	.....	38
46	100	30	83	37	55	83	99	99	.....	53	39
47	168	100	168	68	100	161	168	168	7	113	61
48	146	110	110	36	110	132	146	146	.... ..	77	30
49	41	20	20	11	41	20	41	41	....	12	12
50	115	70	80	45	70	70	115	83	10	63	28
51	41	33	41	8	33	38	41	41	3	27	5
52	84	73	73	22	84	73	84	50	.....	50	20
53	85	75	75	44	75	100	85	70	.....	55	27
54	61	51	51	17	51	49	61	47	.....	44	15

COLLEGIATE INSTITUTES

II.—Table I.—Attendance, Pupils in the

Number of pupils in the various branches of instruction.—(*Con.*)

High Schools.	Botany.	Zoology.	Latin.	Greek.	French.	German.	Writing.	Bookkeeping and Commercial Transactions.	Stenography.	Typewriting.	Drawing.	Temperance and Hygiene.	Vocal Music.
1 Alexandria	...	....	110	6	113	13	57	57	....	....	57	...	....
2 Almonte	60	....	110	8	73	27	60	66	38	....	60	...	....
3 Arnprior	45	..	113	8	66	6	45	45	....	....	45	...	....
4 Arthur	64	....	97	3	27	.....	39	39	28	....	39	...	....
5 Athens	67	..	154	8	77	14	23	52	....	....	128	....	....
6 Aurora	54	..	80	6	75	10	54	54	36	12	54	....	....
7 Beamsville	37	..	47	1	43	2	26	38	.....	....	38	....	....
8 Belleville	160	2	179	3	169	25	57	57	.....	....	89	....	....
9 Berlin	45	..	110	4	48	114	50	125	.....	....	125	....	....
10 Bowmanville	46	2	111	5	69	15	36	36	.....	....	36	...	.. .
11 Bradford	.....	..	73	.....	80	... .	66	66	.. ....	....	66	....	....
12 Brampton	68	3	180	8	178	48	32	68	.....	....	68	....	....
13 Brighton	21	....	52	.....	22	.....	20	20	... .	..	20	....	....
14 Caledonia	43	....	90	.....	10	.. .	32	32	.....	....	32	....	....
15 Campbellford	55	....	100	1	45	18	55	55	.....	....	55	....	....
16 Carleton Place	78	..	125	6	100	18	78	78	.....	....	78	..	....
17 Cayuga	31	...	80	3	53	9	31	31	.....	....	31	....	....
18 Colborne	19	....	70	... .	60	57	19	19	.....	....	19	....	....
19 Cornwall	80	....	156	25	165	45	120	120	.....	...	120	....	120
20 Deseronto	58	...	113	.....	56	10	68	27	.....	....	58	..	....
21 Dundas	66	....	110	3	115	7	60	80	.....	....	75	...	....
22 Dunnville	57	1	101	... .	62	30	64	63	12	....	59	....	....
23 Dutton	38	3	110	2	40	5	30	32	.....	....	32	..	....
24 Elora	40	..	88	.....	45	22	37	38	1	1	37	....	....
25 Essex	27	....	83	3	39	8	29	29	.....	....	29	....	....
26 Fergus	12	....	104	26	90	4	42	42	... .	....	42	....	....
27 Forest	36	..	100	1	40	35	37	37	.....	....	37	....	....
28 Fort William	25	....	32	....	26	... .	17	26	8	....	17	...	....
29 Gananoque	25	..	103	.....	79	25	61	61	.....	...	61	....	....
30 Georgetown	40	...	92	3	57	8	38	38	.....	...	38	...	....
31 Glencoe	40	2	90	4	66	12	35	35	... .	....	35	...	....
32 Gravenhurst	29	...	27	.....	13	.....	29	29	25	....	29	...	..
33 Grimsby	30	....	45	.....	25	4	32	32	.. .	....	32	....	47
34 Hagersville	31	...	70	....	54	9	27	29	.. .	....	29	....	...
35 Harriston	29	1	118	5	90	15	31	29	... .	....	28	....	....
36 Hawkesbury	36	..	70	.....	35	15	36	36	.....	....	36	....	....
37 Iroquois	53	2	103	....	65	14	51	51	57	12	51	....	....
38 Kemptville	39	2	182	7	150	12	39	45	... .	....	45	....	....
39 Kincardine	59	....	118	25	104	24	64	64	.....	....	64	....	....
40 Leamington	33	.	72	.....	57	21	48	48	5	....	44	....	....
41 Listowel	28	....	115	.....	74	44	40	40	8	...	40	....	....
42 Lucan	49	...	100	.....	43	11	53	54	21	8	53	....	....
43 Madoc	40	..	84	... .	33	... .	26	36	... .	....	36	....	....
44 Markham	68	2	180	4	105	4	85	85	85	....	85	...	....
45 Meaford	.....	...	117	2	55	26	32	33	10	....	32	...	....
46 Mitchell	49	....	72	.....	35	21	46	46	.....	....	46	...	...
47 Mount Forest	63	...	126	4	95	7	100	100	45	....	100	...	....
48 Newburgh	75	....	145	.....	71	18	77	77	.....	...	77	....	....
49 Newcastle	24	....	28	....	28	10	13	17	.....	...	17	...	....
50 Newmarket	32	....	109	4	99	42	32	32	... .	...	48	..	....
51 Niagara	14	....	12	.....	15	... .	14	33	... .	..	33	....	....
52 Niagara Falls South	50	....	45	1	20	25	50	50	50	...	50	....	....
53 Norwood	46	...	92	.....	42	3	60	60	.....	....	56	....	..
54 Oakville	56	....	58	1	17	.. .	36	36	.. .	....	36	....	....

AND HIGH SCHOOLS.—*Continued.*

various subjects, and examination results —*Continued.*

	Drill, Calisthenics and Gymnastics.	Agriculture.	Manual Training.	Examination results. No. passed Junior Leaving Pt. I Exam	No. of Honors obtained by such pupils.	No passed Junior Leaving Pt. II Exam.	No. of Honors obtained by such pupils.	No. passed Commercial Diploma Exam. Pts. I and II.	No. passed Commercial Diploma Exam. Pt. II.	No. passed Senior Leaving Pt. I. Exam.	No. of Honors obtained by such pupils.	No. passed Senior Leaving Pt. II Exam.	No. of Honors obtained by such pupils	No. passed Departmental Matriculation Exam.	No passed the Jr. Matriculation Exam. held by any University.	No. of 1st class Jr. Matriculation Honors taken by pupils	No. of 2nd class Jr. Matriculation Honors taken by pupils	No. passed the Sr. Matriculation Exam. held by any University	No. of 1st class Sr. Matriculation Honors taken by pupils	No. of 2nd class Sr. Matriculation Honors taken by pupils.	No. passed the Fin. Exam. other than Department, for any prof n.
1	.....	...	...	7	....	8	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....
2	.....	...	...	11	....	8	....	....	....	2	....	2	....	1	....	....	....	4	2	14	....
3	.....	..	...	12	....	4	....	....	....	2	6	2	6	3	....	....	....	2	6	6	....
4	97	....	....	19	....	7	....	....	....	....	....	9	....	....	....	....	....	....	....	....	....
5	.....	...	...	27	....	29	....	....	....	....	....	..	..	18	....	....	....	..	....	....	2
6	.....	..	...	23	....	4	....	....	....	2	2	2	2	10	....	2	3	1	1	4	.. .
7	.....	....	....	8	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
8	.....	...	....	28	....	14	....	....	....	....	....	....	....	6	....	....	....	....	....	....	....
9	140	....	....	10	....	6	....	....	....	....	....	....	....	2	....	....	1	....	....	....	....
10	.....	...	...	16	....	8	....	....	..	1	...	5	....	....	11	8	6	....	....	....	....
11	42	45	....	11	...	4	....	....	....	..	....	....	....	4	....	....	....	....	....	....	....
12	.....	...	....	29	...	21	....	....	....	2	...	3	....	13	....	2	11	1	....	....	3
13	.....	...	....	11	....	5	....	....	....	....	....	....	....	4	..	....	....	....	....	....	....
14	.....	...	....	28	....	7	....	....	....	....	....	....	....	3	....	....	....	....	....	....	.. .
15	.....	...	....	14	...	10	....	....	....	2	...	2	....	12	1	....	....	1	....	....	3
16	.....	...	...	15	...	10	....	....	....	..	....	....	....	2	2	9	3	2	....	....	....
17	.....	...	...	15	....	8	....	....	....	....	....	2	...	2	....	....	....	....	..	..	2
18	.....	...	..	11	...	10	..	....	....	....	....	....	....	10	....	....	....	....	....	....	....
19	120	...	...	19	...	20	..	....	....	2	6	5	13	2	2	....	....	2	7	..	....
20	70	...	....	15	...	3	....	....	....	2	..	2	....	4	....	....	....	....	..	....	....
21	125	...	....	10	...	6	....	....	....	....	....	....	....	13	1	....	....	....	..	....	....
22	54	...	..	16	....	6	....	....	....	1	....	1	....	1	....	....	....	....	....	....	....
23	.....	...	...	21	....	9	....	..	....	3	...	1	....	4	....	....	....	5	6	8	1
24	.....	...	...	12	....	8	....	....	....	2	....	1	....	4	....	....	....	....	....	....	1
25	82	...	...	17	...	10	....	....	....	3	....	1	..	7	....	2	4	1	....	....	..
26	.....	...	...	13	...	13	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....
27	60	...	...	12	...	10	....	....	....	....	....	....	....	1	....	....	2	....	..	....	....
28	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
29	120	...	....	13	...	9	...	....	..	1	....	....	....	2	..	....	....	....	....	....	....
30	92	....	....	13	...	12	..	.	....	2	....	2	...	1	....	4	1	..	....	..	....
31	35	....	...	4	....	11	....	....	....	4	1	4	..	7	....	....	....	....	....	....	....
32	....	...	...	9	....	5	....	....	....	....	....	....	....	9	....	....	....	....	....	....	....
33	47	....	....	3	...	2	....	....	....	....	....	....	....	2	....	....	....	....	....	..	1
34	... .	....	....	2	....	6	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....
35	.....	...	...	20	...	20	....	....	..	5	2	5	1	4	....	....	....	..	....	....	1
36	.....	...	...	10	....	2	....	..	...	2	....	2	....	4	2	....	....	1	....	....	....
37	.....	...	...	21	..	5	....	....	...	2	....	1	....	6	....	....	3	..	....	....	....
38	.....	...	...	36	....	17	...	....	...	4	....	3	....	16	1	....	....	....	2	....	....
39	118	..	....	22	....	16	...	..	....	2	...	2	....	2	....	....	....	1	...	....	....
40	.....	....	....	16	....	10	....	....	....	....	....	....	....	13	....	....	....	....	....	....	....
41	136	....	...	21	....	13	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....
42	61	..	....	19	....	9	....	....	....	1	....	....	....	3	....	....	....	....	....	....	....
43	.....	....	....	18	....	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
44	180	....	....	18	....	18	....	....	....	2	...	4	...	2	....	....	....	....	....	....	....
45	107	....	....	24	....	9	....	....	....	6	..	4	...	8	....	....	....	....	....	....	....
46	100	....	....	18	..	12	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....
47	161	....	....	20	...	13	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....
48	.....	....	....	21	...	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
49	.....	....	....	5	...	2	....	....	....	....	....	....	....	4	....	....	....	....	....	....	1
50	115	....	....	11	....	10	....	....	....	....	....	....	....	2	....	....	1	..	....	....	....
51	... .	....	....	3	...	..	....	..	....	2	....	....	....	....	....	....	....	....	..	..	....
52	.....	....	....	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3
53	50	....	...	23	....	14	....	....	....	....	....	....	....	37	1	....	....	....	....	....	....
54	.....	...	...	13	...	6	....	..	....	....	....	....	....	3	....	....	....	....	....	....	....

COLLEGIATE INSTITUTES

II.—Table I.—Attendance, Pupils in the

High Schools.	Pupils and Attendance.				Number of pupils			
	Boys.	Girls.	Total.	Average attendance.	Reading.	English Grammar and Rhetoric	English Composition.	Poetical Literature.
55 Omemee	22	22	44	34	30	23	44	44
56 Orangeville	111	102	213	132	120	142	210	213
57 Oshawa	93	82	175	107	133	151	175	175
58 Paris	46	38	84	49	63	66	84	84
59 Parkhill	51	52	103	59	59	66	103	103
60 Pembroke	86	88	174	93	117	152	174	174
61 Petrolea	98	90	188	111	118	178	188	188
62 Picton	119	124	243	145	188	208	243	243
63 Port Arthur	17	50	67	34	67	57	67	67
64 Port Dover	42	43	85	52	49	85	85	85
65 Port Elgin	47	39	86	57	66	66	85	85
66 Port Hope	97	70	167	104	82	112	163	163
67 Port Perry	57	66	123	71	123	123	123	123
68 Port Rowan	35	13	48	24	36	37	48	48
69 Prescott	35	51	86	52	45	65	86	86
70 Renfrew	86	134	220	135	149	188	220	220
71 Richmond Hill	49	37	86	47	84	79	84	84
72 Simcoe	76	77	153	85	133	94	153	153
73 Smith's Falls	71	85	156	98	156	146	156	156
74 Smithville	42	50	92	57	59	75	80	80
75 Stirling	36	30	66	39	66	66	66	66
76 Streetsville	28	21	49	28	22	49	49	49
77 Sydenham	58	75	133	75	39	94	133	133
78 Thorold	35	65	100	65	71	89	100	100
79 Tilsonburg	54	55	109	58	73	79	109	109
80 Toronto Junction	121	137	258	135	167	176	258	258
81 Trenton	62	56	118	70	82	98	118	118
82 Uxbridge	56	59	115	70	63	113	115	115
83 Vankleekhill	66	92	158	98	112	158	158	158
84 Vienna	12	16	28	13	15	28	28	28
85 Walkerton	83	73	156	96	77	98	156	156
86 Wardsville	27	24	51	30	25	32	51	51
87 Waterdown	35	32	67	37	42	49	66	66
88 Waterford	35	29	64	37	52	52	64	64
89 Watford	68	79	147	96	86	103	146	145
90 Welland	69	81	150	85	124	139	150	147
91 Weston	22	26	48	23	42	48	48	48
92 Wiarton	42	46	88	52	53	64	88	88
93 Williamstown	44	56	100	52	93	90	100	100
1 Totals, High Schools	5,161	5,390	10,551	6,252	7,485	8,410	10,439	10,397
2 Totals, Collegiate Institutes	5,404	5,768	11,172	6,704	7,594	8,712	10,943	10,749
3 Grand totals, 1900	10,565	11,158	21,723	12,956	15,079	17,122	21,382	21,146
4 Grand totals, 1899	11,071	11,389	22,460	13,273	16,478	16,953	22,314	22,194
5 Increases						169		
6 Decreases	506	231	737	317	1,399		932	1,048
7 Percentages	48.63	51.37			69	79	98	97
8 Percentage of average to total attendance	59.64							

AND HIGH SCHOOLS.—*Continued.*

various subjects, and examination results.—*Continued*

in the various branches of instruction.

	Supplementary Reading in English Literature.	Canadian History.	English History.	Ancient History.	Geography.	Arithmetic and Mensuration.	Algebra.	Geometry.	Trigonometry.	Physics.	Chemistry.
55	30	30	30	14	30	30	44	44	.....	23	14
56	213	98	112	165	75	143	212	212	21	165	117
57	175	133	175	58	133	152	173	81	24	26	29
58	84	63	67	17	44	66	84	44	4	30	17
59	91	65	78	44	40	66	100	100	10	40	10
60	174	147	147	57	115	128	174	93	2	74	44
61	188	118	188	44	118	178	188	116	5	65	21
62	170	154	167	74	130	243	240	180	20	105	50
63	67	57	57	10	67	67	67	31	.....	21	10
64	49	49	75	27	49	68	85	46	....	53	31
65	85	66	66	34	51	66	85	62	....	43	23
66	163	82	105	85	82	112	160	120	23	120	85
67	123	76	72	54	76	76	118	112	10	82	34
68	....	25	25	20	25	37	48	23	.....	17	8
69	45	45	56	30	35	65	86	58	11	49	25
70	220	158	159	66	149	188	220	130	5	108	39
71	84	77	77	26	77	84	84	84	.....	29	17
72	153	94	104	69	94	94	140	100	10	75	59
73	156	146	156	63	117	150	156	96	10	96	63
74	58	58	58	22	52	75	80	52	5	63	33
75	66	42	42	24	42	55	66	66	.....	47	22
76	49	22	22	20	22	35	48	35	.....	24	8
77	133	94	94	43	94	107	133	98	.....	73	34
78	100	67	67	33	63	89	109	97	.....	40	10
79	73	48	73	36	47	89	109	70	....	51	23
80	258	162	191	96	101	177	257	146	21	127	68
81	118	49	82	36	83	98	118	69	.....	49	20
82	115	64	75	40	63	103	107	107	4	48	23
83	158	76	122	46	112	127	158	122	9	46	39
84	28	28	28	13	28	28	28	28	....	21	10
85	156	77	136	75	77	98	156	108	18	104	56
86	51	29	29	26	27	32	51	43	.....	15	10
87	66	42	42	24	42	49	66	66	.....	13	20
88	64	52	52	21	32	52	64	40	.....	40	12
89	133	86	11	42	46	102	146	100	11	12	87
90	146	32	130	42	72	139	147	120	5	83	35
91	37	29	42	11	42	48	48	29	.....	25	11
92	88	53	55	35	53	64	88	61	3	27	25
93	100	90	90	18	65	90	100	78	.....	30	7
1	9,720	6,737	7,593	3,816	6,102	8,352	10,342	7,959	501	5,312	3,021
2	10,432	7,362	8,354	3,707	6,308	8,656	10,225	7,650	824	4,953	2,702
3	20,152	14,099	15,947	7,553	12,410	17,008	20,567	15,609	1,325	10,265	5,723
4	21,297	15,678	17,352	6,892	12,371	16,720	21,799	15,701	1,340	10,235	5,934
5	.....	.....	.....	661	39	288	.....	.....	.....	30	.....
6	1,145	1,579	1,415	.....	.....	.....	1,232	92	15	.....	211
7	93	65	73	35	57	78	95	72	6	47	26
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

COLLEGIATE INSTITUTES

II.—Table I.—Attendance, Pupils in the

High Schools.	Number of pupils in the various branches of instruction.—(*Con.*)												
	Botany.	Zoology.	Latin.	Greek.	French.	German.	Writing.	Bookkeeping and Commercial Transactions.	Stenography.	Typewriting.	Drawing.	Temperance and Hygiene.	Vocal Music.
55 Omemee	15	....	44	2	44	40	15	15	....	....	15	....	....
56 Orangeville	99	4	105	13	96	33	65	65	....	....	....	....	....
57 Oshawa	115	....	146	12	63	48	89	115	....	....	114	....	....
58 Paris	40	..	69	....	30	16	40	44	....	...	40	....	....
59 Parkhill	30	2	100	5	45	5	29	32	....	....	29	.	....
60 Pembroke	62	....	148	....	85	....	70	99	....	...	99	...	....
61 Petrolea	122	....	160	24	106	2	72	72	....	....	72	....	....
62 Picton	97	....	209	1	224	97	86	113	24	....	119	..	....
63 Port Arthur	36	....	40	. .	40	25	36	36	....	....	36	....	....
64 Port Dover	25	...	58	2	25	12	26	26	....	....	26	....	....
65 Port Elgin	50	....	85	2	84	42	20	48	....	....	48	....	....
66 Port Hope	48	3	150	7	97	65	44	74	74	...	44		...
67 Port Perry	62	....	118	7	67	35	76	76	25	....	76	76	80
68 Port Rowan	30	....	39	1	23	4	30	30	....	....	30	...	....
69 Prescott	24	...	69	....	47	20	28	28	....	....	28	....	....
70 Renfrew	58	....	133	21	112	6	149	116	51	....	111	..	....
71 Richmond Hill	40	...	83	8	53	14	19	53	....	11	53	....	....
72 Simcoe	70	...	100	10	55	30	94	49	23	....	94	....	....
73 Smith's Falls	75	....	141	4	91	32	75	75	58	24	75	....	....
74 Smithville	32	4	91	1	38	....	28	28	....	....	28	...	....
75 Stirling	31	...	64	....	6	....	19	19	....	..	19	.	....
76 Streetsville	18	....	49	1	36	1	18	19	....	....	18	....	....
77 Sydenham	39	..	133	....	47	21	39	39	....	....	39	....	....
78 Thorold	15	....	75	. .	49	12	29	67	40	30	40	....	....
79 Tilsonburg	32	....	78	1	32	2	8	38	....	...	38	....	....
80 Toronto Junction	88	5	234	14	101	36	84	84	..	....	73	...	...
81 Trenton	65	....	98	....	56	2	49	64	15	....	58	...	....
82 Uxbridge	29	....	101	2	100	37	29	29	....	...	29	....	....
83 Vankleekhill	76	....	152	....	120	41	76	76	....	....	76	....	....
84 Vienna	7	....	23	2	15	....	7	6	....	....	7	...	....
85 Walkerton	48	2	148	8	69	52	47	47	....	....	47	....	....
86 Wardsville	8	....	51	....	16	14	8	25	..	....	8	...	....
87 Waterdown	27	....	55	1	30	6	23	23	....	....	23	....	....
88 Waterford	30	...	50	....	48	6	40	40	....	....	40	....	....
89 Watford	46	....	141	....	37	11	46	46	....	....	46	....	....
90 Welland	65	....	144	8	139	47	25	72	....	....	72	.	....
91 Weston	42	....	21	....	.....	.....	42	42	16	16	42	....	....
92 Wiarton	30	....	56	2	23	8	39	39	....	...	39	....	....
93 Williamstown	57	...	99	....	78	31	57	57	....	....	57	...	....
1 Totals, High Schools	4,253	40	9,217	351	5,941	1,764	4,225	4,654	757	114	4,655	76	247
2 " Collegiate Insts.	4,373	198	8,856	502	6,709	2,130	4,286	5,058	1,935	869	4,690	....	110
3 Grand totals, 1900	8,626	238	18,073	852	12,650	3,894	8,511	9,712	2,692	983	9,345	76	357
4 " 1899	10,376	245	19,131	1,176	13,464	5,513	9,031	10,623	2,694	...	10,240	...	136
5 Increases	.....	....	.....	.....	.....	.....	.....	.....	.....	983	.....	76	221
6 Decreases	1,750	7	1,058	323	814	1,619	520	911	2	....	895	...	....
7 Percentages	40	1	83	4	58	18	39	45	12	4.53	43	.35	1.64

AND HIGH SCHOOLS.—*Continued.*

various subjects, and examination results.—*Concluded.*

				Examination results.																			
	Drill, Calisthenics and Gymnastics.	Agriculture.	Manual Training.	No. passed Junior Leaving Pt. I Exam.	No. of Honors obtained by such pupils.	No. passed Junior Leaving Pt. II Exam.	No. of Honors obtained by such pupils	No passed Commercial Diploma Exam. Pts I and II.	No. passed Commercial Diploma Exam. Pt. II.	No. passed Senior Leaving Pt. I Exam.	No. of Honors obtained by such pupils.	No. passed Senior Leaving Pt. II Exam.	No of Honors obtained by such pupils.	No. passed Departmental Matriculation Exam.	No. passed the Jr. Matriculation Exam held by any University.	No. of 1st class Jr. Matriculation Honors taken by pupils.	No. of 2nd class Jr. Matriculation Honors taken by pupils.	No. passed the Sr. Matriculation Exam held by any University	No. of 1st class Sr. Matriculation Honors taken by pupils.	No. of 2nd class Sr. Matriculation Honors taken by pupils.	No. passed the En. Exam. other than Dep'tmentl, for any prof'n.
55	.....	....	...	5	....	3	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....
56	.....	....	....	33	1	28	....	....	....	1	....	3	....	14	1	....	..	3	....	....	....	5
57	.....	....	....	19	....	15	....	....	....	5	....	5	....	14	....	....	....	....	....	....	....	....
58	.....	..	...	9	....	4	....	....	....	....	....	....	....	12	....	....	....	....	....	....	....	....
59	51	....	....	8	....	10	..	....	....	3	....	3	....	10	....	....	....	....	....	....	....	....
60	174	....	....	16	....	5	....	....	....	....	....	....	....	11	....	....	....	....	....	....	....	2
61	94	....	...	19	....	9	....	....	....	....	....	....	....	8	....	....	....	....	....	....	....	3
62	.....	....	....	27	....	11	1	....	....	4	....	5	....	14	....	8	1	3	5	....	....	1
63	.....	....	....	3	....	2	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	2
64	.....	....	....	10	....	6	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	1
65	.....	..	..	20	....	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
66	.....	....	....	14	....	12	....	....	....	6	....	6	....	2	....	....	....	3	8	15	....	....
67	123	....	....	8	....	12	....	....	....	2	....	4	....	8	....	....	....	....	....	....	....	3
68	... ..	....	....	9	....	1	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....
69	.....	...	....	13	....	9	....	....	....	....	....	2	....	10	....	....	....	....	....	....	....	....
70	86	....	....	27	....	15	....	....	....	2	....	2	....	1	3	1	....	1	1	....	....	....
71	84	....	....	14	....	5	....	....	....	....	....	1	....	1	....	....	....	1	....	....	....	....
72	94	....	....	18	....	5	....	....	....	2	....	1	..	1	4	2	....	....	....	....	....	....
73	.....	....	....	16	....	22	....	....	....	4	..	1	....	22	....	....	....	1	....	....	....	....
74	.....	....	....	10	....	10	....	..	..	5	....	1	....	4	....	....	....	1	1	2	....	....
75	.....	....	....	13	....	5	..	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....
76	.....	....	....	13	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
77	.....	....	....	24	....	14	....	....	....	....	....	....	....	1	....	....	....	....	..	....	....	40
78	.....	....	....	13	....	4	....	....	1	....	....	....	....	1	5	....	....	....	....	....	....	....
79	.....	....	....	18	....	5	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	2
80	.....	....	..	25	....	20	....	....	....	6	1	5	2	22	1	13	2	....	....	....	....	2
81	.....	....	....	22	....	5	....	....	....	....	....	....	..	1	....	....	....	....	....	....	....	....
82	103	....	....	22	1	12	....	....	....	....	....	5	1	16	....	....	....	....	....	....	....	....
83	149	....	....	14	....	8	..	....	....	2	....	3	..	7	2	....	....	....	....	....	....	....
84	28	....	....	5	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
85	.....	9	....	23	....	16	....	....	....	8	....	7	....	7	....	....	....	....	....	....	....	....
86	.....	....	..	7	....	3	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....
87	.....	...	....	6	....	1	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....
88	.....	....	....	8	....	4	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
89	.....	....	....	36	....	15	..	....	....	1	....	4	....	....	....	....	....	....	....	....	....	6
90	.....	....	....	10	....	9	....	....	....	....	....	3	....	10	....	....	....	....	....	....	....	....
91	.....	....	....	5	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
92	.....	....	....	14	....	9	....	....	....	1	....	....	..	6	....	3	....	....	....	....	....	3
93	.....	....	....	7	....	6	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....
1	3,100	54	....	1,405	2	823	1	....	1	109	18	126	25	484	42	54	42	34	39	49	88
2	9,130	....	68	1,066	3	659	....	14	28	197	11	180	15	454	211	247	211	28	30	22	66
3	12,230	54	68	2,471	5	1,482	1	14	29	306	29	306	40	938	253	301	253	62	69	71	154
4	9,684	...	...	.....	....	.....	....	....	....	....	....	....	...	615	164	...	....	35	....	....	....
5	2,546	54	68	.....	....	...	....	....	....	....	....	....	..	323	89	....	....	27	....	....	....
6	... ..	....	....	.....	....	...	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....
7	56	.25	.31	11	....	7	....	....	....	1.4	....	1.4	....	4.3	1.16	1.4	1.16	.28	.32	.33	.79

COLLEGIATE INSTITUTES

III —Table K —Miscellaneous

Collegiate Institutes.	Brick, stone or frame school house.	No. of acres in playground.	Schools under United Board.	Equipment.								Religious exer			
				Value of Library (not including Supplementary Reading in English Literature).	Value of Supplementary Reading in English Literature.	Value of Scientific Apparatus.	Value of Charts, Maps and Globes.	Value of Models for Drawing.	Value of Gymnasium (not including Equipment).	Value of Appliances for Physical Education.	Value of Museum of Natural History, etc.	Value of School Buildings, Grounds and Furniture, not included in preceding items.	Schools using authorized Scripture Readings	Schools opened with prayer.	Schools closed with prayer.	Schools using Bible.
				$	$	$	$	$	$	$	$	$				
1 Aylmer.	B	4	..	614	9	694	125	28	680	85	300	15,000		1	..	..
2 Barrie	B	3	..	612	..	685	118	7	1,730	90	.....	8,115	....	1	1	..
3 Brantford.	B	1	..	610	43	862	108	27	1,000	128	..	18 000	....	1	..	1
4 Brockville	S	2½	..	600	76	1,001	179	10	..	299	.	25,770	1	1	1	..
5 Chatham	B	1½	..	736	34	1,340	167	10	600	134	50	30,000	1	1	1	1
6 Clinton.	B	2¼	..	674	..	809	125	5	765	60	25	10,500	1	1	..	1
7 Cobourg	B	1	..	611	66	599	110	..	668	219	.....	7,000	1	1	1	1
8 Collingwood	B	1	..	640	....	640	82	6	1,300	29	....	24,000	1	1	..	..
9 Galt	S	8½	..	1,049	.....	1,020	67	9	1,200	205	27	20,000	1	1	..	..
10 Goderich	B	¼	..	616	21	678	71		2,500	200	.	16,000	1	1	..	..
11 Guelph	S	4	1	895	31	803	144	12	2,500	557	50	12,000	..	1	..	..
12 Hamilton.	B	3½	1	971	....	1,480	133	....		909	50	156,919	1	1	..	1
13 Ingersoll	B	2	1	687	45	687	121	4	721	231	...	18,000	1	1	..	..
14 Kingston	B	2 1/16	1	729	123	640	62	25		.....	100	35,000	1	1	1	1
15 Lindsay	B	2	1	1,060	62	989	133	10	600	126	25	31,000	....	1	..	..
16 London.	B	3	1	855	....	2,610	169	134	.	298	700	80,000	....	1	1	..
17 Morrisburg	B	1	1	632	82	1,199	132	7	980	188	125	12,400	1	1	..	..
18 Napanee	B	3½	1	776	45	864	126	2	800	226	25	26,000	..	1	..	1
19 Niagara Falls	B	5	.	655	70	618	87	....	1,064	112	....	27,000	....	1	..	1
20 Orillia	B	2½	.	542	29	747	110	68	1,800	250	.	15,576	....	1		1
21 Ottawa	S	1½	.	1,043	63	1,426	270	150	2,040	184	100	70,000	1	1	1	1
22 Owen Sound	B	1	1	1,291	41	1,677	113	20		91	50	25,000	...	1	1	1
23 Perth	B	5	1	698	33	798	155	10	560	267	500	19,500	1	1	..	..
24 Peterborough.	B	2½	1	598	115	866	149	25	600	160	100	.....	....	1	1	..
25 Ridgetown	B	1¾	.	605	10	1,004	135	48	900	90	25	10,000	....	1	1	..
26 Sarnia	B	2½	1	717	..	676	102	..	1,380	168	....	44,000	1	1	1	..
27 Seaforth	B	2¾	.	726	.....	664	155	5	666	33	50	15,000	1	1	..	.
28 Stratford.	B	5	.	844	.	1,096	210	26	....	117	.....	35,000	1	1	..	..
29 Strathroy	B	1¼	..	713	149	895	114	28	380	102	....	10.000	1	1	..	..
30 St. Catharines	B	¾	..	631	....	733	127	18	700	75	10	15.000	1	1	..	..
31 St. Marys	B	2	..	590	35	626	113	25	700	74	.....	16,000	....	1	..	..
32 St. Thomas	B	2¼	1	815	55	905	110	18	983	299	.....	20,000	....	1	..	..
33 Toronto (Harbord).	B	1½	..	865	202	2,061	174	23	4,000	710	.....	88,500	....	1	..	..
34 " (Jameson).	B	1½	.	1,35	192	2,116	155	15	4,000	790	.....	62,000	1	1	..	1
35 " (Jarvis)	B	3	.	1,065	..	945	406	39	8,257	643	20	56,000	....	1	1	1
36 Whitby.	B	1	1	621	3	451	94	10	850	209	.....	8,000	....	1		1
37 Windsor	B	2	1	779	.	974	123	35	3,000	200	200	35.200	..		..	..
38 Woodstock	B	1	..	979	77	1,372	148	15	2,000	174	75	14,000	1	1	..	..
Totals	B S 34 4	91.35	15	29,395	1,661	38,163	5,222	874	49,923	8,738	2,607	.....	20	37	12	14

AND HIGH SCHOOLS —*Continued.*

Information.

and other cises.		Number of pupils in—				Number of pupils from—			Destination of pupils.						Occupation of parents.				
Religious instruction imparted.	Commencement exercises.	Form I.	Form II.	Form III.	Form IV.	Municipalities composing the High School District	Municipalities within the County.	Other counties.	Number who entered Mercantile life.	Number who became occupied with Agriculture.	No. who ent'rd the professions Law, Medicine and the Church.	Number who became teachers.	Number who entered any other profession.	Number who left for other occupations.	Commerce.	Agriculture.	Mechanical Occupations.	Professions.	Without occupation.
1 ..	1	34	54	42	11	69	68	4	9	9	5	6	....	11	26	78	25	11	1
2 ..	.. .	72	69	114	19	134	135	5	14	....	2	17	1	.. .	57	85	48	22	62
3 ..	1	117	101	101	30	273	72	4	13	8	5	6	2	4	97	83	136	32	1
4 ..	1	138	90	66	25	244	70	5	12	2	....	15	....	4	90	70	150	15	14
5 ..	1	100	150	83	13	244	100	2	30	20	10	20	10	10	125	90	98	33	.. .
6 ..	1	57	33	58	17	79	82	4	11	6	3	15	...	12	57	57	30	13	8
7 ..	.	80	17	17	8	120	2	...	12	6	5	10	2	3	40	26	40	9	7
8 ..	....	27	61	59	11	104	28	16	2	2	0	11	....	18	48	42	23	16	29
9 ..	1	61	104	52	9	131	74	21	14	6	5	8	26	7	36	63	97	17	13
10 .	1	91	59	88	22	159	89	12	13	3	6	17	....	22	51	88	45	40	36
11 ..	1	57	82	65	27	189	34	8	8	1	2	6	....	17	79	38	54	24	36
12 ..	1	177	169	200	117	544	72	47	70	20	10	45	4	30	319	84	148	102	10
13 ..	1	81	38	25	9	79	62	12	7	7	2	6	3	27	41	66	31	15	.....
14 ..	....	253	65	89	23	393	30	7	17	3	2	17	2	82	125	45	178	65	17
15 ..	1	53	65	124	13	154	89	12	25	10	9	17	4	26	76	83	46	34	16
16 ..	....	287	299	170	60	697	102	17	114	13	8	28	17	72	337	80	206	64	129
17 ..	1	34	30	101	23	89	99	...	10	6	4	19	1	25	29	77	31	11	40
18 ..	1	89	67	57	15	123	100	5	8	9	3	12	4	22	79	88	21	19	21
19 ..	1	71	104	49	22	131	94	21	5	2	3	13	2	26	65	57	96	13	15
20 ..	....	66	63	82	16	140	58	29	4	7	3	12	3	12	75	46	49	26	31
21 ..	1	226	85	78	37	368	46	12	101	27	33	21	15	229	162	47	83	85	49
22 ..	....	92	79	150	56	200	113	64	18	11	15	53	4	40	138	87	92	37	23
23 ..	1	108	38	51	19	141	70	5	10	8	1	20	2	5	49	86	47	24	10
24 .	...	126	50	84	14	214	57	3	15	4	3	12	6	48	74	49	105	35	11
25 ..	1	20	90	60	16	94	85	7	10	17	3	14	3	6	45	75	45	20	1
26 ..	....	140	45	56	11	181	68	3	5	6	0	7	3	39	69	57	52	26	48
27 ..	1	37	54	82	13	9	96	.	5	10	8	15	4	8	15	90	40	15	26
28 ..	1	94	95	90	21	222	60	18	17	6	9	20	....	26	101	56	83	28	32
29 ..	1	55	72	42	13	91	88	3	10	40	5	12	20	20	36	97	26	17	6
30 ..	1	93	124	61	23	214	81	6	20	14	12	10	7	27	62	68	70	33	68
31 .	1	47	66	72	26	114	51	46	12	10	6	8	9	14	43	87	53	12	16
32 ..	....	229	64	77	29	293	106	..	60	30	8	17	5	8	161	106	100	17	15
33 ..	1	144	180	145	44	513	....		28	...	2	14	2	92	220	7	98	98	90
34 ..	1	152	119	45	28	329	9	6	26	....	2	7	41	38	151	18	96	30	49
35 ..	....	146	184	90	21	409	30	2	..	...	....	..	....	.....	.....	.....	.....	...	.....
36 ..	1	95	24	32	11	93	67	2	8	10	....	3	1	5	15	59	41	19	28
37 ..	1	127	107	52	17	231	72	.	21	....	5	5	6	22	86	39	128	22	28
38 ..	1	89	105	77	31	186	107	9		... ..		....	...	... .	94	84	60	31	33
....	27	3,965	3,301	2,936	920	8,079	2,676	417	767	333	199	538	209	1,057	3,373	2,458	2,751	1,130	1,019

COLLEGIATE INSTITUTES

III.—Table K.—Miscellaneous

High Schools.	Brick, stone or frame school house.	No. of acres in playground.	Schools under United Board.	Equipment. Value of Library (not including supplementary reading in English Literature).	Value of Supplementary Reading in English Literature.	Value of Scientific Apparatus.	Value of Charts, Maps and Globes.	Value of Models for Drawings.	Value of Gymnasium (not including Equipment).	Value of Appliances for Physical Education.	Value of Museum of Natural History, etc.	Value of School Buildings, Grounds and Furniture, not included in preceding items	Religious exercises. Schools using authorized Scripture readings.	Schools opened with prayer.	Schools closed with prayer.
				$	$	$	$	$	$	$	$	$			
1 Alexandria ..	B	1⅕	..	256	.....	370	85	....	.....	.....	...	8,000	....	1	..
2 Almonte	S	1	1	815	69	430	75	12	...	8	20	379	1	1	1
3 Arnprior	B	1	1	310	20	361	87	....	.....	38	.....	8,225	....	1	1
4 Arthur ...	B	2½	..	264	31	550	27	31	.....	6	.....	5,500	....	1	..
5 Athens.....	S	2	..	435	64	399	61	10	....	4	.....	5,000	1	1	..
6 Aurora.....	B	3	..	527	66	443	68	8	....	.....	.....	750	....	1	..
7 Beamsville ...	B	2	1	293	....	281	70	....	.....	.....	.....	2,600	....	1	..
8 Belleville.....	B	1½	1	286	219	472	162	21	.....	..	.....	.....	....	1	1
9 Berlin	B	3	..	393	4	1,100	43	15	.....	11	50	10,000	1	1	..
10 Bowmanville .	B	1½	..	540	25	476	60	8	.....	....	.....	18,500	1	1	..
11 Bradford	B	3	.	287	7	342	20	15	.....	22	25	6,000	...	1	1
12 Brampton....	B	5	.	400	56	581	67	24	.....	10	25	8,000	...	1	..
13 Brighton	B	⅔	1	258	12	313	37	....	.....	.....	.....	4,000	1	1	1
14 Caledonia	B	2	1	417	.....	561	52	4	...	....	.....	12,000	...	...	..
15 Campbellford.	B	½	1	296	....	436	29	....	.....	.....	.....	11,500	1	1	..
16 Carlton Place.	S	1	1	508	210	404	57	4	.....	3	..	8,000	....	1	..
17 Cayuga	B	1½	..	176	.....	335	38	....	.....	.....	.....	4,000	.	1	..
18 Colborne	B	¾	1	248	9	275	79	5	....	.....	.....	8,300	1	1	..
19 Cornwall	B	⅓	..	446	....	522	158	8	...	...	...	15,000	1	1	1
20 Deseronto	B	4½	..	270	33	394	85	4	300	211	50	15,000	....	...	..
21 Dundas	B	2	1	453	....	509	95	20	... ..	39	....	6,000	....	1	1
22 Dunnville	B	¼	..	364	18	456	65	23	.....	.....	...	5,500	....	1	..
23 Dutton.....	B	1	..	201	18	440	31	....	..	...	....	4,800	...	1	
24 Elora	S	½	..	174	25	344	70	2	.....	..	....	5,000	1	1	..
25 Essex	B	3¼	..	260	60	428	84	28	700	196	....	10,000	1	1	..
26 Fergus	S	¾	1	234	16	240	65	. .	.	.....	....	6,000	...	1	..
27 Forest	B	2	..	306	....	306	62	21	.....	.....	...	10,000	....	1	..
28 Fort William.	B	2	..	49	77	143	57	3	.....	.....	....	...	...	...	..
29 Gananoque ..	B	1	1	458	26	471	108	....	. .	....	....	25,000	1	1	..
30 Georgetown ..	B	4	..	191	25	346	63	10	.....	5	....	12,782	1	1	..
31 Glencoe	B	2	..	304	36	566	55	28	.....	....	....	9,000	....	1	1
32 Gravenhurst..	B	7½	..	143	25	358	46	....	.....	....	...	7,000	...	1	1
33 Grimsby	F	1	..	168	6	237	20	10	.....	.....	....	2,000	1	1	..
34 Hagersville...	B	1½	..	306	....	450	32	....	.....	.....	....	6,000	1	1	..
35 Harriston	B	3	..	153	2	360	60	....	.....	.....	....	7,500	....	1	1
36 Hawkesbury .	B	1	1	410	....	367	45	....	.. ..	....	....	13,000	1	1	1
37 Iroquois	B	¾	..	603	....	1,027	126	18	.....	27	250	15,000	1	1	..
38 Kemptville...	B	2	1	300	....	380	68	....	.....	18	....	10,190	...	1	..
39 Kincardine ..	B	4	1	454	75	628	89	34	.....	14	....	6,000	1	1	..
40 Leamington ..	B	1¼	..	258	27	402	87	33	.....	11	....	10,000	1	1	.
41 Listowel	B	4	..	333	....	365	64	...	250	42	....	7,000	....	1	..
42 Lucan.....	B	3	..	200	85	576	73	18	.....	.....	...	10,000	....	1	1
43 Madoc	B	1	..	172	...	389	90	....	.....	.....	....	8,000	1	1	..
44 Markham	B	1½	..	242	6	734	46	38	.....	13	....	6,000	1	1	1
45 Meaford	B	3	..	257	....	492	46	....	1,250	169	....	12,500	1	1	..
46 Mitchell.....	B	¾	.	232	....	326	64	21	566	223	1	13,000	1	1	..
47 Mount Forest.	B	2	..	389	30	518	38	....	.. ..	.....	....	12,000	1	1	..
48 Newburg	S	2	1	418	12	331	58	....	.....	.. ..	....	4,000	....	1	..
49 Newcastle	B	1	1	156	....	288	46	4	.....	.....	....	7,500	1	1	..
50 Newmarket ..	B	1	..	149	31	413	69	20	300	87	...	11,000	....	1	..
51 Niagara	B	½	..	187	....	177	69	15	....	.....	....	3,500	1	1	1
52 Niagara F'ls S.	B	2	..	239	29	288	41	3	.....	30	....	10,000	...	1	..
53 Norwood	B	8	1	329	....	306	27	....	.....	2	....	7,000	....	1	..
54 Oakville.....	B	⅔	1	267	....	241	24	....	.....	.....	....	3,500	1	1	1

AND HIGH SCHOOLS.—*Continued.*

Information.—*Continued.*

Schools using Bible.	Religious instruction imparted.	Commencement exercises.	Number of Pupils in and other cises. Form I.	Form II.	Form III.	Form IV.	Number of Pupils from— Municipalities composing the High School District.	Municipalities within the County.	Other counties.	Destination of Pupils. Number who entered Mercantile life.	Number who became o cupied with agriculture.	No. who ent'd the professions of law, medicine & the church	Number who became teachers.	No. who ent'd any other prof'n.	Number who left for other occupations.	Occupation of Parents. Commerce.	Agriculture.	Mechanical Occupations.	Professions.	Without occupation.
1	..	1	45	38	30	....	103	4	6	4	3	....	8	1	4	18	75	18	2	....
2	1	..	60	21	38	5	91	25	8	9	3	1	9	...	19	33	25	47	4	15
3	..	..	45	36	30	3	86	16	12	3	2	3	7	2	6	13	23	74	4	....
4	..	1	19	29	36	13	48	48	1	6	7	2	8	...	3	37	46	11	3	....
5	..	1	30	52	68	6	61	93	2	3	6	1	18	2	2	36	84	17	6	13
6	1	..	32	22	32	6	56	35	1	10	10	1	3	0	7	21	33	26	11	1
7	..	..	26	28	13	....	35	32	....	2	13	..	2	...	6	9	35	10	5	8
8	1	..	117	74	48	6	213	30	2	20	3	2	11	2	12	45	40	96	13	51
9	1	..	71	54	36	3	98	66	.. .	23	4	..	5	...	23	79	20	33	27	5
10	1	..	36	45	25	13	73	42	4	4	3	1	10	...	17	28	33	28	10	20
11	1	..	22	35	30	....	47	39	1	6	3	4	8	1	4	9	42	26	7	3
12	..	1	68	31	75	23	91	99	7	12	15	3	16	4	....	26	105	43	12	11
13	1	1	20	13	19	....	26	26	....	3	2	1	4	2	1	5	20	20	3	4
14	..	1	25	33	35	....	37	44	12	4	8	2	7	.	12	16	39	21	12	5
15	..	1	30	35	38	4	65	39	3	5	4	3	8	1	5	27	29	35	3	13
16	..	..	78	31	29	5	116	25	2	12	4	....	8	2	21	38	31	65	9	....
17	..	1	31	20	30	9	30	59	1	. .	9	....	4	6	17	9	46	18	8	9
18	..	..	19	18	35	....	49	23	...	....	1	1	4	...	6	19	30	10	3	10
19	1	..	86	49	51	8	124	67	3	10	5	10	13	...	12	12	20	25	15	....
20	..	..	47	21	43	2	94	17	2	8	1	....	5	. .	14	35	16	47	3	12
21	1	1	46	35	44	....	79	46	...	8	3	..	5	...	6	25	26	41	8	1
22	..	..	42	40	27	6	69	41	5	5	5	2	2	..	14	31	42	29	11	2
23	..	1	30	44	32	10	47	63	6	....	..	1	3	3	12	4	52	6	4	3
24	..	..	24	28	35	10	41	51	5	5	5	2	8	3	2	16	42	23	6	10
25	..	1	16	28	32	9	36	49	...	7	1	1	8	...	1	16	44	15	7	3
26	..	..	42	28	34	....	84	20	....	12	5	8	12	...	....	30	35	20	19	....
27	1	..	37	35	38	....	52	57	1	8	3	2	9	. .	18	20	40	29	3	18
28	..	..	17	11	5	....	33	....	....	....	....	....	....	....	....	3	..	15	...	15
29	..	1	35	48	37		83	21	16	9	2	1	8	...	15	41	39	28	12	....
30	..	1	28	29	31	9	39	30	28	4	3	2	6	...	4	24	42	10	6	5
31	1	1	20	26	30	14	46	37	7	8	7	..	7	1	11	18	40	12	6	14
32	..	..	9	20	21	....	29	18	3	6	1	....	7	...	5	17	12	18	2	1
33	..	1	19	18	10	....	25	16	6	3	..	....	....	1	10	5	19	13	3	1
34	1	..	15	30	24	3	72	....	....	3	3	1	2	..	15	16	34	18	4	....
35	..	..	17	22	69	14	56	35	31	5	2	2	22	7	9	30	45	7	15	....
36	..	1	17	30	18	6	25	44	2	5	4	2	1	1	2	16	25	23	4	3
37	..	1	35	46	29	6	39	60	17	4	3	1	6	1	11	23	58	20	10	5
38	..	..	39	62	70	16	64	47	76	5	4	6	8	3	4	41	62	55	20	....
39	1	..	43	30	47	17	72	62	3	8	4	5	14	2	12	38	71	12	15	1
40	..	1	44	48	34	7	67	59	7	3	5	2	3	...	4	30	40	35	10	18
41	..	1	30	37	69	...	73	31	32	2	0	2	11	...	15	29	39	29	18	21
42	..	1	24	39	43	5	49	62	....	3	3	3	8	2	7	27	48	8	10	16
43	1	..	36	25	23	....	41	42	1	3	4	..	7	2	3	6	30	34	7	7
44	1	..	43	42	75	20	30	142	8	11	13	11	8	...	4	23	76	20	8	12
45	..	1	32	26	49	15	62	46	12	10	4	1	9	2	11	20	49	14	22	15
46	..	1	33	28	39	....	65	33	2	3	4	....	12	2	5	15	37	30	8	10
47	..	1	54	46	61	7	110	24	34	7	3	2	10	3	12	36	51	43	20	18
48	..	1	69	41	36	....	43	103	....	5	15	2	7	2	4	30	70	21	15	10
49	..	1	13	17	11	...	19	22	....	4	..	1	....	....	3	6	11	3	5	3
50	1	1	32	38	35	10	49	61	5	1	1	1	2	1	10	11	53	34	5	7
51	..	..	14	19	5	3	21	19	1	....	4	..	3	4	..	2	19	5	10	5
52	..	1	25	37	22	....	82	2	....	7	....	....	....	....	8	17	35	20	3	9
53	1	..	32	28	40	....	50	41	9	2	6	1	1	2	5	20	50	23	5	2
..	..	1	22	21	18	....	35	24	2	5	4	2	6	2	3	14	17	16	8	6

COLLEGIATE INSTITUTES

III.—Table K.—Miscellaneous

High Schools.	Brick, stone or frame school house.	No. of acres in playground.	Schools under United Board.	Equipment.									Religious exercises		
				Value of Library (including supplementary reading in English Literature.	Value of Supplementary Reading in English Literature.	Value of Scientific Apparatus.	Value of Charts, Maps and Globes.	Value of Models for Drawing.	Value of Gymnasium (not including Equipment).	Value of Appliances for Physical Education.	Value of Museum of Natural History, etc.	Value of School Buildings, Grounds and Furniture, not included in preceding items	Schools using authorized Scriptural readings	Schools opened with prayer.	Schools closed with prayer.
				$	$	$	$	$	$	$	$	$			
55 Omemee	F	1	1	232	7	260	44	...	...	3	...	3,000	...	1	1
56 Orangeville	B	2½	..	568	....	505	57	26	...	....	...	11,250	...	1	1
57 Oshawa	B	3	1	377	...	306	120	14	...	...	50	10,736	1	1	..
58 Paris	B	4	1	308	5	543	111	9	...	...	..	3,500	1	1	1
59 Parkhill	B	3	1	290	26	483	93	3	...	44	50	8,300	..	1	1
60 Pembroke	B	⅝	1	238	19	474	92	....	...	..	....	12,100	...	1	..
61 Petrolea	B	2⅝	..	390	...	359	44	5	...	..	..	7,500	1	1	.
62 Picton	B	3	..	638	9	623	118	45	...	...	...	7,500	....	1	1
63 Port Arthur	B	⅝	..	240	...	290	48	..	...	....	20	15,000	...	1	..
64 Port Dover	B	2	1	272	..	402	19	20	...	7	....	9,000	1	1	..
65 Port Elgin	B	1¼	..	182	59	350	43	30	...	...	...	4,500	...	1	..
66 Port Hope	B	1	..	459	53	448	72	8	....	10	..	14,262	1	1	..
67 Port Perry	B	1¾	1	270	....	440	44	8	22	122	15	12,000	...	1	1
68 Port Rowan	B	2	1	90	3	205	22	....	...	8	...	5,000	1	1	..
69 Prescott	B	1½	1	194	30	367	109	....	...	29	...	9,980	....	1	..
70 Renfrew	B	⅞	1	226	39	293	37	12	...	....	....	10,000	1	1	1
71 Richmond Hill	B	⅝	1	97	18	253	31	28	...	2	....	6,500	1	1	..
72 Simcoe	B	3½	1	265	28	671	134	29	...	29	...	12,000	1	1	..
73 Smith's Falls	B	⅝	1	428	125	495	67	5	...	...	...	8,000	....	1	1
74 Smithville	B	1	..	107	...	280	29	....	...	...	....	3,360	1	1	1
75 Stirling	B	1	1	160	9	262	33	...	...	...	..	4,500	...	1	1
76 Streetsville	B	¼	..	180	32	242	71	2	...	...	25	3,000	..	1	1
77 Sydenham	S	1½	..	262	91	289	31	...	...	...	....	15,000	..	1	1
78 Thorold	B	2¼	..	258	9	339	69	3	...	4	...	8,500	...	1	.
79 Tilsonburg	B	3	..	232	20	530	68	2	...	...	....	12,500	..	1	1
80 Toronto Junc.	B	1	..	593	...	858	95	22	...	...	..	40,000	1	1	..
81 Trenton	B	3½	1	362	8	394	81	8	...	...	....	6,150	1	1	..
82 Uxbridge	B	1	1	265	43	335	52	4	...	...	....	8,000	1	1	1
83 Vankleek Hill	B	2⅓	..	467	4	658	37	3	35	22	....	12,000	...	1	..
84 Vienna	B	2	1	224	51	252	105	10	500	51	....	3,500	1	1	1
85 Walkerton	B	1¼	..	325	..	458	54	3	...	...	..	8,000	1	...	..
86 Wardsville	B	2	1	219	17	191	73	33	...	...	....	5,000	....	1	..
87 Waterdown	S	3¼	1	196	....	330	41	5	...	...	....	5,500	...	1	..
88 Waterford	B	3	.	320	4	408	61	...	...	...	....	7,800	1	1	1
89 Watford	B	2	..	323	..	385	109	47	...	20	....	9,000	...	1	1
90 Welland	B	1	..	170	15	513	28	..	...	...	...	12,000	...	1	1
91 Weston	B	½	..	274	..	434	75	15	...	...	....	5,000	...	1	..
92 Wiarton	S	1½	..	312	15	251	45	....	...	...	....	8,500	...	1	1
93 Williamstown	B	3	..	192	29	312	10	....	...	...	....	10,000	...	1	1
	B. S. F.														
1 Totals, H. S.	82 9 2	182.93	38	27,989	2,222	38,436	5,915	917	3,923	1,540	581		42	89	35
2 " Coll. In.	34 4	91.35	15	29,395	1,661	38,163	5,222	874	49,923	8,738	2,607		20	37	12
3 G'd totals, 1900	116 13 2	274.28	53	57,384	3,883	76,599	11,137	1,791	53,846	10,278	3,188		62	126	47
4 " " 1899	113 14 2	275.82	52	55,219		74,069	10,896		*62,156		2,816		60	127	
5 Increases	3		1	2 165		2,530	241				372		2		
6 Decreases	1	1.54												1	
7 Percentages	B. 88.55 S 9.92 F. 1.53		40										47	96	36

* Including appliances for Physical Education.

AND HIGH SCHOOLS.—*Concluded.*

Information.—*Concluded.*

and other cises.			Number of Pupils in—				Number of Pupils from—			Destination of Pupils.						Occupation of Parents.				
Schools using Bibles.	Religious instruction imparted.	Commencement exercises.	Form I.	Form II.	Form III.	Form IV.	Municipalities composing the High School District.	Municipalities within the County.	Other counties.	Number who entered mercantile life.	Number who became occupied with agriculture.	No. who ent'd the professions of law, medicine & the church.	Number who became teachers.	No. who ent'd any other prof'n.	Number who left for other occupations	Commerce.	Agriculture.	Mechanical Occupations.	Professions.	Without occupation.
55..	..	..	7	23	14	..	22	22	..	1	3	4	3	...	33	3	25	6	4	5
56..	..	1	30	52	108	23	87	80	46	13	9	5	26	5	28	49	92	32	22	18
57..	..	1	92	25	35	23	118	44	13	20	8	1	6	...	22	40	62	53	20	..
58..	..	1	40	23	17	4	63	16	5	4	2	...	3	...	12	21	20	25	7	11
59..	..	1	29	30	32	12	56	43	4	2	3	...	6	2	6	9	24	4	4	6
60..	..	1	85	32	56	1	125	46	3	9	4	2	5	3	21	40	34	60	24	16
61..	..	..	118	26	39	5	123	65	...	12	2	...	5	3	11	28	22	45	5	....
62..	..	..	107	63	53	20	144	96	3	....	...	4	11	...	....	54	113	52	21	3
63..	..	1	36	21	10	....	67	....	...	20	10	..	5	..	2	20	10	20	5	5
64..	..	1	25	34	26	....	48	28	9	6	3	1	3	3	8	12	33	14	7	13
65 1	..	1	23	28	35	..	51	35	...	4	2	2	4	...	14	29	23	13	12	9
66..	..	1	44	38	62	23	102	65	....	11	1	2	14	...	15	42	56	28	20	21
67..	..	1	41	35	37	10	62	48	13	8	5	5	10	4	6	31	46	30	11	5
68..	..	..	25	9	14	..	23	24	1	3	2	1	3	...	6	11	19	4	2	5
69..	.	1	28	17	30	11	66	19	1	5	1	....	6	2	4	21	17	24	4	20
70	..	1	90	59	66	5	126	90	4	12	3	....	16	3	25	36	42	18	3	....
71..	..	1	25	31	28	2	79	7	....	3	5	....	3	..	17	17	50	8	9	2
72 1	..	1	49	45	49	10	61	88	4	20	30	1	5	...	...	33	70	30	15	5
73..	..	..	60	33	53	10	121	18	17	7	4	2	15	4	20	28	36	82	10	....
74 1	..	.	29	30	22	11	55	34	3	...	6	6	7	...	....	7	49	5	7	1
75 1	..	..	19	23	24	...	27	38	1	3	9	..	5	3	3	5	39	6	3	...
76 1	..	.	13	9	27	....	12	23	14	1	3	1	3	...	5	5	35	4	....	5
77	.	.	39	51	43	....	130	2	1	4	12	2	12	...	....	12	49	21	...	....
78 1	..	1	29	38	33	....	77	23	....	5	6	3	1	2	8	20	40	15	10	10
79 1	..	1	38	35	36	....	65	20	24	5	5	2	3	3	4	7	20	14	7	5
80..	..	1	109	47	74	28	100	54	104	15	10	5	7	7	45	56	45	67	24	66
81..	..	..	49	33	39	....	89	16	13	15	4	2	3	2	17	37	22	18	13	28
82 .	..	1	29	34	40	12	63	50	2	5	9	...	14	7	4	14	50	23	1	23
83..	..	..	76	36	37	9	72	58	28	2	2	....	6	...	....	14	62	20	5	9
84..	..	..	7	8	13	...	24	....	4	...	1	....	1	...	...	1	25	2	....	....
85..	..	1	48	27	63	18	82	67	7	15	4	4	16	1	10	40	65	25	19	7
86..	..	1	8	17	26	....	25	10	16	1	2	3	3	...	1	7	26	7	5	6
87..	..	1	23	19	24	1	58	3	6	2	4	3	...	...	4	7	35	5	10	9
88..	..	..	24	17	23	....	22	42	...	7	4	....	2	2	10	11	38	8	3	4
89..	..	..	48	40	47	12	48	94	5	6	10	3	12	5	....	24	90	30	3	....
90 1	..	1	71	32	41	6	66	83	1	4	3	....	7	3	16	37	66	23	15	9
91 1	..	..	38	10	....	....	26	17	5	5	5	....	1	...	9	4	15	14	4	11
92 1	..	1	27	26	32	3	76	8	4	3	1	4	5	8	12	20	9	40	11	8
93..	..		60	20	20	....	96	1	3	1	....	2	3	...	3	8	44	9	9	3
1 27	1	58	3,679	2,963	3,359	550	6,087	3,714	750	564	424	169	633	139	837	2,075	3,763	2,303	823	769
2 14		27	3,965	3,301	2,986	920	8,079	2,676	417	767	333	199	538	209	1,057	3,373	2,458	2,751	1,130	1,019
3 41	1	85	7,644	6,264	6,345	1,470	14,166	6,390	1,167	1,331	757	368	1,171	348	1,894	5,448	6,221	5,054	1,953	1,788
4 41		89	8,407	6,912	5,701	1,440	14,603	6,658	1,199	1,449	944	467	1,297		1,910	6,493	7,320	6,237	2,410	
5 ..	1				644	30														
6 ..		4	763	648			437	268	32	118	187	99	126		16	1,045	1,099	1,183	457	
7 31	1	65	35.19	28.83	29.21	6.77	65.21	29.42	5.37							26	30	25	10	9

Table L.—Protestant Separate Schools.

Statistics.	No 5, Bromley.	No. 9, Cambridge.	No. 6, North Plantagenet.	Puslinch.	Rama.	L'Orignal.	Penetangui-hene.	Totals.
Number of schools	1	1	1	1	1	1	1	7
Receipts:	$ c	$ c.	$ c.	$ c	$ c.	$ c	$ c.	$ c.
Balances from 1899	94 36	9 54	43 49	76 57	155 88	419 94	5 75	805 53
Government grants	36 60	4 75	3 90	13 15	48 58	40 45	110 77	258 20
Municipal grants						300 00	2,187 44	2,487 44
Trustees' school taxes	215 31	85 57	310 00	111 87	200 00			922 25
Other sources				77 98	85 75	1 85	6 00	171 58
Total	346 27	99 86	357 39	279 57	490 21	762 24	2,309 96	4,645 50
Expenditure:								
Teachers salaries	220 00	83 00	250 00	230 00	350 00	410 00	1,410 00	2,943 00
School sites and buildings			4 70				238 50	263 20
Libraries, maps, etc			98				39 31	40 29
Other expenses	24 80	11 57	53 17	17 70	97 39	44 60	565 41	814 64
Total	244 80	94 57	308 85	247 70	447 39	454 60	2,263 22	4,061 13
Balances on hand	101 47	5 29	48 54	31 87	42 82	307 64	46 74	584 37
Teachers:								
Male					1		1	2
Female	1	1	1	1		1	3	8
Certificates	III	Temp.	II	III	II	III	1, II; 3, III.	3, II; 6, III; 1 Temp.
Salaries	220 00	156 00	250 00	230 00	350 00	410 00	Male, $600 00 Female, $267 00	Av. Male, $475 00 Av. Female, $258 00
Pupils:								
Total number attending	21	20	13	28	79	47	208	416
Boys	10	10	7	11	42	18	103	201
Girls	11	10	6	17	37	29	105	215
Average attendance	10	8	5	11	44	28	132	238
No. in 1st Reader, Part I	3	4	5	6	21	7	55	101
" 1st " Part II	3	4	1	4	9	6	48	75
" 2nd "	1	5	2	2	14	12	32	68
" 3rd "	10	2		7	23	2	38	82
" 4th "	1	5	4	5	11	20	22	68
" 5th "	3		1	4	1		13	22
" writing	21	20	13	28	49	47	208	386
" arithmetic	21	20	13	28	58	47	208	395
" drawing	21	20	13	28	49	47	208	386
" geography	14	12	7	18	35	26	145	257
" music		20	13	28		47	63	171
" grammar and composition	13	7	8	18	49	40	92	227
" English history	5	5	5	9	12	20	35	91
" Canadian history	8	5	5	16	35	20	73	162
" physiology and temperance	1	5	3	18	11	14	35	87
" drill and calisthenics		20	13	28		47		108
" bookkeeping	3			9	2		13	27
" algebra	3		1	4	1		13	22
" geometry			1	4	1		13	19
" botany				4			13	17
" elementary physics				4				4
" agriculture	1		1	16				18
Sch. houses (brick, frame or log)	Frame	Log	Frame	Frame	Frame	Brick	Brick	2B., 4F., 1L.
Number of maps	7	6	8	10	16	13	6	66
Number of globes	1			1	1	1		4

Table M.—Report on Truancy.

Cities.	No. of children otherwise employed during school hours.	No. of cases of truancy reported.	No. of complaints made before Police Magistrates or J. P.s.	No. of convictions.	No. of children not attending any school.
Belleville		160	3		
Brantford		250	14	14	23
Chatham		37	2		
Guelph	5	46			
Hamilton		98	35	9	
St. Catharines		77	1		
St. Thomas	4	62	5	5	
Stratford		35			
Toronto	10	636	10	4	
Windsor	13	388	2		
Towns.					
Almonte		30			
Amherstburg		2			
Arnprior		2			
Aurora		5			
Aylmer		63			
Barrie		27			
Berlin		6			
Bowmanville		26			
Bracebridge		2			2
Brockville		45	1	1	
Collingwood	4	25			
Deseronto		6			
Dundas	2				
Durham		4			1
Forest	2	4	2	2	
Galt		10	2		
Gore Bay		1			
Gravenhurst		15			
Lindsay	12	74	7	5	1
Listowel		13			
Milton		8			5
Newmarket		8			
Niagara		15			
Niagara Falls	4	38	5	3	10
North Bay	2				
Orangeville	1				
Owen Sound		17			
Pembroke	2	17			2
Perth		16	1	1	
Peterborough		30	2		
Petrolea	6	75			5
Port Arthur		3			3
Prescott			2		
Preston		60			
St. Mary's		2			
Sarnia		83		3	
Simcoe		2			
Stayner	4	16	3	3	
Strathroy		3			
Thornbury		1			
Thorold		8			
Toronto Junction		10	1		7
Trenton	13	22	7		13
Vankleek Hill		2			
Walkerton		39			39
Wiarton		12			
Villages.					
Ailsa Craig		1			
Bayfield		2			
Burk's Falls		2			
Burlington		4			
Campbellford		5			
Colborne		5			
Drayton		10			10
Dundalk		20			1
Elora		5			
Exeter	10	5			
Garden Island	4				
Georgetown		60	1	1	
Glencoe	5	3			
Hespeler		35			
Huntsville		6			
Markdale		2			
Oil Springs		6			1
Point Edward		14			
Stirling		4			4
Tara		12			
Wroxeter		1			
Totals	103	2,838	106	51	127

Table N.—Report on Kindergartens.

Locality.	No. of Kindergartens.	No. of Teachers.	No. of pupils attending.	Average attendance.
Cities :				
Belleville	1	2	46	17
Brantford	3	8	378	149
Chatham	2	4	213	82
Guelph	1	2	145	52
Hamilton	14	20	1,324	482
Kingston	3	3	285	108
London	14	28	1,076	404
Ottawa	13	20	1,107	455
Stratford	3	5	296	100
Toronto	45	128	4,488	1,998
Towns :				
Aylmer	1	2	74	45
Berlin	4	5	415	175
Dundas	1	1	107	47
Galt	1	1	67	47
Ingersoll	1	2	112	46
Niagara Falls	1	3	116	36
Owen Sound	1	2	86	49
Peterborough	2	4	200	75
Preston	1	1	71	46
Simcoe	1	1	81	19
Tilsonburg	1	1	59	20
Toronto Junction	2	2	151	65
Waterloo	1	1	100	8
Villages :				
Ashburnham	1	2	74	36
Campbellford	1	1	74	25
Hespeler	1	1	89	53
Totals	120	250	11,234	4,639

Table O.—Report on Night Schools

Locality.	No. of Night Schools.	Teachers.	Pupils attending.	Average attendance.
St. Catharines	1	1	32	7
Toronto	10	18	702	142
Windsor	1	2	61	16
Totals	12	21	795	165

Table P —General Statistical Abstract

A General Statistical Abstract, exhibiting the comparative state and progress of Education in Ontario, as connected with Public, Separate and High Schools (including Collegiate Institutes); also Normal College and Normal and Model Schools, from the year 1867 to 1900, compiled from Returns in the Education Department.

No.	Subjects compared.	1867.	1872.	1877.	1882.	1887.	1892.	1897.	1900.
1	Population		1,620,851		1,926,922		2,114,321		
2	School population between the ages of five and sixteen years, up to 1884, (and five to twenty-one subsequently)	447,726	495,756	494,804	483,817	611,212	595,238	590,055	580,105
3	High Schools (including Collegiate Institutes)	102	104	104	104	112	128	130	131
4	Normal College and Normal and Model Schools	3	3	4	6	6	6	7	8
5	Total Public Schools in operation	4,261	4,490	4,955	5,013	5,277	5,577	5,574	5,655
6	Total Roman Catholic Separate Schools	161	171	185	190	229	312	340	356
7	Grand total of all schools in operation	4,527	4,768	5,248	5,313	5,624	6,023	6,051	6,149
8	Total pupils attending High Schools (including Collegiate Institutes)	5,696	7,968	9,229	12,318	17,459	22,837	24,390	21,723
9	Total students and pupils attending Normal College, Normal and Model Schools	800	800	900	1,059	1,204	1,270	1,492	1,674
10	Total pupils attending Public Schools	382,719	433 256	465,908	445,361	462,839	448,201	441,157	432,126
11	Total pupils attending Roman Catholic Separate Schools	18,924	21,406	24,952	26,148	30,373	37,466	41,620	42,397
12	Grand total, students and pupils attending High, Public, Separate, Normal College, and Normal and Model Schools	408,139	463,430	500,989	484,918	511,875	509,777	508,659	497,920
13	Total amount paid for the salaries of Public and Separate School Teachers	$1,093,516	1,371,594	2,038,099	2,144,448	2,458,540	2,752,628	2,886,001	2,985,278
14	Total amount paid for the erection and repairs of Public and Separate School houses, and for libraries, apparatus, books, fuel, stationery, etc	$379,672	835,770	1,035,390	882,526	1,283,565	1,301,289	1,329,609	1,601,805
15	Grand total paid for Public and Separate School Teachers' salaries, the erection and repairs of school houses, and for libraries, apparatus, etc	$1,473,188	2,207,364	3,073,489	3,026,974	3,472,105	4,052,917	4,215,670	4,587,083
16	Total amount paid for High School (including Collegiate Institutes) Teachers' salaries	$94,820	141,812	211,607	253,864	327,452	470,828	532,837	529,245
17	Total amount paid for erection and repair of High School (including Collegiate Institutes) houses, maps, apparatus, prizes, fuel, books, etc	$19,190	31,360	51,417	89,857	168,160	215,871	183,139	189,356
18	Amount paid for other educational purposes*	$332,825	439,690	250,968	262,307	280,832	353,987	346,820	347,293
19	Grand total paid for educational purposes	$1,920,023	2,820,226	3,587,481	3,633,002	4,518,549	5,094,603	5,278,466	5,652,977
20	Total Public and Separate School Teachers	4,890	5,476	6,468	6,857	7,594	8,480	9,128	9,440
21	Total male teachers	2,849	2,626	3,020	3,062	2,718	2,770	2,784	2,630
22	Total female teachers	2,041	2,850	3,448	3,795	4,876	5,710	6,344	6,810

* Colleges and Private Schools are included for 1867 and 1872.

APPENDIX B.—*TEACHERS' INSTITUTES.*

Financial Statement, 1900

Name of Institute.	Number of Institutes.	Number of members.	Receipts.					Expenditure.				Balances.
			Government grant.	Municipal grant.	Members' fees.	Balances and other sources.	Total receipts.	Printing, postage, etc.	Libraries, educational journals, etc.	Miscellaneous.	Total expenditure.	
			$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1 Algoma, East	1	50	25 00	.....	.....	10 83	35 83	2 92	1 13	.....	4 05	31 78
2 Algoma, West	1	22	25 00	.....	.....	6 83	31 83	2 40	19 65	.....	22 05	9 78
3 Brant	1	147	25 00	25 00	.....	164 50	214 50	75	3 00	34 50	38 25	176 25
4 Bruce, East	1	122	25 00	25 00	.....	24 91	74 94	10 41	16 33	24 55	51 29	23 65
5 Bruce, West	1	35	25 00	25 00	8 75	182 57	241 32	15 70	37 25	76 85	129 80	111 52
6 Carleton	1	130	25 00	.....	.....	59 58	84 58	10 05	.....	36 17	46 22	38 36
7 Dufferin	1	121	25 00	25 00	10 00	.....	60 00	18 40	24 20	15 00	57 60	2 40
8 Dundas	1	113	25 00	25 00	23 00	117 81	190 81	35 52	.....	80 85	116 37	74 44
9 Durham	1	120	25 00	25 00	.....	128 09	178 09	10 87	.....	67 00	77 87	100 22
10 Elgin	1	175	25 00	25 00	.....	147 40	197 40	14 75	.....	44 00	58 75	138 65
11 Essex, North	1	65	25 00	50 00	.....	67 53	142 53	11 00	.....	41 50	52 50	90 03
12 Essex, South	1	115	25 00	50 00	.....	161 58	236 58	41 00	.....	61 60	102 60	133 98
13 Frontenac	1	150	25 00	25 00	.....	54 83	104 83	3 29	.....	27 00	30 29	74 54
14 Glengarry	1	90	25 00	25 00	.....	31 30	81 30	21 58	.....	20 85	42 43	38 87
15 Grenville (Leeds No. 3)	1	100	25 00	25 00	.....	50 20	100 20	2 90	.....	31 67	34 57	65 63
16 Grey, East	1	33	25 00	25 00	8 25	105 74	163 99	3 76	6 15	123 15	133 06	30 93
17 Grey, West	1	116	25 00	25 00	9 00	57 77	116 77	9 67	8 30	59 35	77 32	39 45
18 Grey, South	1	56	25 00	25 00	14 00	206 47	270 47	.....	52 35	57 75	110 10	160 37
19 Haldimand	1	118	25 00	25 00	.....	207 44	257 44	19 15	.....	36 45	55 60	201 84
20 Haliburton	1	54	25 00	.....	.....	53 43	78 43	1 69	29 07	22 67	53 43	25 00
21 Halton	1	90	25 00	25 00	.....	112 76	162 76	1 00	23 23	28 75	52 98	109 78
22 Hastings, North	1	112	25 00	25 00	12 00	152 61	214 61	45 65	23 35	5 50	74 50	140 11
23*Hastings, South	1	130	25 00	25 00	.....	291 68	341 68	4 50	.....	41 00	45 50	296 18
24 Huron, West (S.)	1	45	25 00	25 00	16 50	79 96	146 46	6 60	23 41	55 30	85 31	61 15
25 Huron, East (N.)	1	125	25 00	25 00	.....	63 63	113 63	7 35	26 84	55 20	89 39	24 24
26 Kent, East	1	56	25 00	25 00	28 00	87 88	165 88	13 05	.....	99 15	112 20	53 68
27 Kent, West (C. D)	1	131	25 00	25 00	19 25	61 32	130 57	21 67	9 06	42 00	72 73	57 84
28 Lambton, East	1	115	25 00	25 00	20 00	66 92	136 92	32 75	.....	56 28	89 03	47 89
29 Lambton, West	1	125	25 00	25 00	.....	75 89	125 89	31 65	.....	22 35	54 00	71 89
30 Lanark	1	.....	25 00	25 00	4 50	135 93	190 43	10 00	12 65	.....	22 65	167 78
31 Leeds, West (1)	1	103	25 00	25 00	.....	92 34	142 34	11 29	43 48	19 42	74 19	68 15
32 Leeds, East (2)	1	122	25 00	25 00	19 75	192 67	262 42	11 84	73 30	54 80	139 94	122 48
33 Lennox and Addington	1	127	25 00	25 00	.....	38 77	88 77	8 85	.....	20 00	28 85	59 92
34 Lincoln	1	116	25 00	25 00	.....	196 18	246 18	3 91	.....	41 15	45 06	201 12
35 Manitoulin	1	21	25 00	.....	.....	15 00	40 00	.....	.....	5 00	5 00	35 00

36 Middlesex, East	1	103	25 00	55 00	22 75	46 47	149 22	108 77	33 05		141 82	7 40	
37 Middlesex, West	1	109	25 00	100 00	51 00	86 62	262 62	51 82		130 60	182 42	80 20	
38 Muskoka	1	65	25 00			95 55	120 55	3 70		2 75	6 45	114 10	
39 Nipissing	1	27	25 00		15 25	12 21	52 46	2 75	12 50	17 68	32 93	19 53	
40 Norfolk	1	142	25 00	50 00		98 92	173 92	50 07	32 50	34 15	116 72	57 20	
41 Northumberland	1	150	25 00	25 00		204 91	254 91	11 85	22 50	41 95	76 30	178 61	
42 Ontario, North	1	86	25 00	25 00	38 50	25 00	113 50	9 89		56 55	66 44	47 06	
43 Ontario, South	1	85	25 00	25 00		24 85	74 85	5 82		17 00	22 82	52 03	
44 Oxford	1	189	25 00	25 00		65 04	115 04	5 49		42 50	47 99	67 05	
45 Parry Sound, East	1	24	25 00		6 75	14 85	46 60	4 13		13 40	17 53	29 07	
46 Parry Sound, West	1	40	25 00		5 20	9 40	39 60	4 10	14 25		18 35	21 25	
47 Peel	1	103	25 00	25 00		44 76	94 76	7 00	25 00	27 00	59 00	35 76	
48 Perth	1	144	25 00	25 00		41 95	91 95	2 85		46 80	49 65	42 30	
49 Peterborough	1	111	25 00	25 00		62 48	112 48	13 87	11 48	68 48	93 83	18 65	
50 Prescott and Russell	1	118	25 00			22 61	47 61	95		13 40	14 35	33 26	
51 Prince Edward	1	90	25 00	25 00		98 84	148 84	3 40	10 34	40 10	53 84	95 00	
52 Renfrew	1	75	25 00	25 00		44 33	94 33	9 93		46 00	55 93	38 40	
53 Rainy River	1	29	25 00		5 50		30 50	3 75			3 75	26 75	
54 Simcoe, East, and Muskoka, West	1	60	25 00	25 00		93 56	143 56	1 06	6 62	54 95	62 63	80 93	
55 Simcoe, North	1	123	25 00	50 00		69 55	144 55	11 37		33 05	44 42	100 13	
56 Simcoe, Southwest	1	45	25 00	25 00	11 25	230 46	291 71	15 03		52 10	67 13	224 58	
57 Stormont	1	52	25 00	25 00		43 46	93 46	5 94	1 25	50 40	57 59	35 87	
58 Victoria, East	1	82	25 00	37 50		65 29	127 79	28 75	1 00	10 00	39 75	88 04	
59 Victoria, West	1	79	25 00	25 00		40 81	90 81	6 00	18 50	15 05	39 55	51 26	
60 Waterloo	1	69	25 00	25 00	31 50	59 08	143 58	18 48		95 80	114 28	29 30	
61 Welland	1	141	25 00	25 00		108 17	158 17	9 70		110 00	119 70	38 47	
62 Wellington, North	1	112	25 00	25 00	8 50	53 29	111 79	16 05	31 82	10 00	57 87	53 92	
63 Wellington, South	1	95	25 00	25 00		84 31	134 31	9 44		63 90	73 34	60 97	
64 Wentworth	1	106	25 00	25 00		82 03	132 03	8 25	17 35	45 25	70 85	61 18	
65 York, North	1	58	25 00		14 50	75 53	115 03	7 91	50 55	20 00	78 46	36 57	
66 York, South	1	70	25 00	25 00	17 50	164 43	231 93	19 55	38 53	74 00	132 08	99 85	
67†Ontario Educational Association	1	627	600 00		313 75	678 50	1,592 25	859 62		337 10	1,196 72	395 53	
Cities.													
68 Guelph	1	34	25 00	25 00		60 06	110 06	30	96 39	3 00	99 69	10 37	
69 Hamilton	1	173	25 00	25 00	43 00	118 16	211 16	16 85		81 10	97 95	113 21	
70†Kingston	1	60	25 00	25 00	18 50	102 05	170 56	3 05	31 60	89 70	124 35	46 21	
71 London	1	161	25 00	25 00	16 00	44 53	110 53	7 30		46 75	54 05	56 48	
72 Ottawa	1	163	25 00	25 00		46 93	96 93	4 50	40 20	30 38	75 05	21 88	
73 St. Catharines	1	25	25 00			38 57	63 57		51 88		51 88	11 69	
74 St. Thomas	1	41	25 00	25 00		52 68	102 68	8 50	29 30	39 73	77 53	25 15	
75 Toronto	1	606	25 00	25 00	151 50	397 69	599 19	31 12	167 76	150 50	349 38	249 81	
76 Windsor and Town of Walkerville	1	59	25 00	25 00		11 85	61 85	2 50		52 75	55 25	6 60	
Totals, 1900	76	8,081	2,475 00	1,767 50	966 95	7,222 17	12,431 62	1,837 33	1,177 12	3,470 65	6,485 10	5,946 52	
" " 1899	76	8,309	2,425 00	1,922 35	952 60	7 283 72	12,583 67	1,847 53	1,322 41	3,385 81	6,555 75	6,027 92	
Increases			50 00		14 35					84 84			
Decreases		228		154 85		61 55	152 05	10 20	145 29		70 65	81 40	

* Statistics of preceding year. † Statement for 1900-1901.

APPENDIX C —*CONTINUATION CLASSES, 1900-1901.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate	No of Teachers.		Name of School.	Class of School A	B	C	D
W. J. Kelly, M.D., LL.B.	Brant	Arthur E. Green	I	4	8	S. Dumfries	..	1	..	..
		John Hicks	II	2	8	Burford	..	1	..	..
		Alberta A. Langs	II	1	11	"	..	..	1	..
		Jean Gissing	II	1	6	"	..	..	1	..
		K. McK. Smith	II	2	18	"	..	..	1	..
		Mary Turnbull	II	1	1	Oakland	..	..	1	..
		John J. McGill	II	1	7	S. Dumfries	..	..	1	..
		E Featherstone	II	1	13	Brantford	..	..	1	..
		Thos. M. Cayley	III	1	4	"	..	..	1	..
W. S. Clendening	Bruce, E.	R. D. McMurchy, B.A.	I	8	*	Chesley, V	1	..	..	..
		J. F Loney	I	2	U.	3 Amable and Arran	..	..	1	..
		J. W. Ward	II	3	14	Carrick	..	..	1	..
A. Campbell	Bruce, W	Jos. E Hodgson, B.A.	I	6	*	Paisley, V	1	..	..	..
		D. D. Yule	I	4		Lucknow, V	..	1	..	..
		J. E. Coombes	II	4		Teeswater, V	..	1	..	..
		E. S. Coultes	I	3	10	Huron	..	1	..	..
		Jos. Stalker	II	1	10	Kinloss	..	..	1	..
		D. T. Mackenzie	II	1	12	Culross	..	..	..	1
B. H. Cowley, B.A.	Carleton	T. H. McGuirl, B.A.	I	3	11	Osgoode	1	..	..	..
		J. L. Bryant	I	3		Richmond, V	..	..	1	..
		H. W. Brownlee	III	2	3	N. Gower	..	..	1	..
		Hattie Seabrook	II	1	14	Goulbourn	..	..	..	1
		Miss C. J McEwen	I	1	2	"	..	..	..	1
		Wm. C. Macartney	II	1	15	Gloucester	..	..	..	1
		Jas. E. Burchell	II	1	3	Marlborough	..	..	..	1
N. Gordon	Dufferin	D. Campbell	II	5		Grand Valley, V	1	..	..	..
		J. C. Clark, B.A.		6		Shelburne, V	1	..	..	..
		John T. Kidd	II	1	11	Mulmur	..	..	1	..
		Thos. Bell	III	1	7	Amaranth	..	..	1	..
		John K. Blair	III	1	4	E. Luther	..	..	1	..
		Maggie Wilkinson	III	1	10	Mulmur	..	..	1	..
		R. A. Winter	II	2	2	Melancthon	..	..	1	..
		Minnie Babe	III	1	19	Mono	..	..	1	..
		Wm. Heath	II	2	17	"	..	..	..	1
A. Brown	Dundas	Hiram B. Fetterley	I	6		Winchester, V	1	..	..	..
		S. W. Hill	I	5		Chesterville, V	1	..	..	..
		Phoebe Colborne	II	2	6	Mountain	..	..	1	..
		John A. Shaver	II	2	18	& 1 Williamsburg	..	..	..	1
		Horatio Loucks	I	3	12	Winchester	..	..	..	1
W. E. Tilley, M.A., Ph.D.	Durham	D. Hampton	II	4		Millbrook, V	1	..	..	..
		D. Somerville	II	2	15	Manvers	..	..	1	..
		J. C. Groat	II	2	11	Darlington	..	..	..	1
		Edw. Mitchell	II	1	5	Manvers	..	..	..	1
W. Atkin	Elgin	F. Tanton	I	4	5	Aldborough	1	..	..	..
		Jos. L. Garvin	I	4	6	"	1	..	..	..
		George Stewart	II	3		Springfield, V	..	1	..	..
		Wm. Keast	I	3	20	Yarmouth	..	1	..	..
		J. W. Brown	II	2	3	Southwold	..	1	..	..
		John McFadyen	II	2	12	"	..	..	1	..
		Arthur Curtis	II	2	13	Dunwich	..	..	1	..
		Wm. Walker	II	2	2	Bayham	..	..	1	..
		A. H. Nevills	II	2	18	"	..	..	1	..
		J. C. McLennan	III	1	11	Southwold	..	..	1	..
		Edward Witty	II	2		Port Stanley, V	..	..	1	..
		R. F. Whiting	II	2	7	Yarmouth	..	..	1	..
		Effie McEachran	I	1	9	Aldborough	..	..	..	1
		Herbert Brunion	III	1	7	S. Dorchester	..	..	..	1
		Geo. T Abbitt	III	1	17	Bayham	..	..	..	1
D. Chenay	Essex, N	Nellie Moynahan	II	2	6	Sandwich, S	..	..	1	..
D. A. Maxwell, B.A., LL.B.	Essex, S	Miss Sealey, B A	....	5	*4	W. Tilbury	1	..	..	..
		May Botsford	I	5		Amherstburg, T	1	..	..	..
		Fred. J. Voaden	II	7		Kingsville, V	..	1	..	..
		Jas. H. Black	II	1	2	S. Colchester	..	..	1	..
		Harry Ricker	III	1	5	"	..	..	..	1

* In all schools marked with an asterisk, two of the teachers devote all their time to Continuation Class work.

APPENDIX C.—*Continued.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate.	No. of Teachers.		Name of School.	Class of School. A	B	C	D
W. Spankie, M.D ..	Frontenac	G. Emberly	II	2	2	Kennebec			1	
		T. P. Maxwell	III	1	2	Storrington.....				1
		Miss M Gummer....	II	1	14	Loughboro'				1
D. McDiarmid, M.D.	Glengarry	W. J. Hull..... ...	I	3		Maxville, V		1		
		Wm. B. McEwan ..	II	3	12	Charlottenburgh....			1	
A. Grier.....	Grey, E	J. B. Gillesby	I	3		Thornbury, T			1	
		G. W. Mason..... .	I	2	U. 4	Euphrasia			1	
		D. Forrester.	I	2	13	Collingwood			1	
		Emma M. Miller.....	III	2	U	5 Euphrasia				1
		Thos. A. Wright.....	II	1	5	Collingwood				1
N. W. Camdbell....	Grey, S	T. Allan	I	7	*	Durham, T...	1			
		J. W. Brown, B A. .	I	7		Hanover, V	1			
		Jas. S. Rowe.....	II	4		Markdale, V		1		
		Geo. W. Slaughter...	I	3	5	Artemesia		1		
		J. A. Speers.	I	4		Dundalk, V		1		
		W. J. Blakeston....	II	2	U 12	Artemesia & Glenelg			1	
		W J. Huston	II	2	16	Normanby			1	
		Alex. Firth.....	II	1	1	Glenelg	1			1
C. Moses.....	Haldimand.....	Dawson F. Aiken....	I	4	10	Walpole				
		Jno. B. Widdis.....	I	2	3	"			1	
		Eva Lymburner	I	2	2	Cauboro'				1
		Alice Martin	II	1	2	Walpole				1
S. Phillips, B.A....	Haliburton, etc.	A. M. Burchill	I	5		Burks' Falls, V	1			
		H. I. Case.	I	2	4	N. Himsworth.....			1	
		A. C. Bernath.....	I	7		Huntsville, T.....			1	
		R. B. Stephenson....	II	3	8	S. Himsworth . ..				1
		Geo. Hall	III	2		Sundridge, V. .. .				1
J. S. Deacon.....	Halton	W. F. Inman	I	7	*	Milton, T	1			
		A. Baynton	II	4		Burlington, V.....		1		
		T. T. Moore	II	5		Acton, V.....			1	
		W J. McClenahan ..	II	1	3	Nelson				1
W Mackintosh.....	Hastings, N....	E. T. Williams	II	3		Marmora, V.....				1
J. Johnston	Hastings, S ...	M. W. Mott.	II	2	12 & 14	Thurlow.		1		
		John M. Bell.....	II	1	3	Hungerford			1	
		George Meiklejohn ..	II	4		Tweed, V			1	
		Robinson Morton ..	II	2	1	Hungerford				1
		Mary O'Reilly	III	1	6	"				1
		Chas. M. Clare	III	2	13	"				1
		Geo. A Barker ...	I	1	4	Sidney				1
		Stuart Tulloch.....	III	1	11	Tyendinaga.....				1
		Thos. Meagher	III	1	7	"				1
		E. O. Platt	I	1	18	Thurlow				1
D. Robb...	Huron, E.....	A. H. Musgrove... .	II	8		Wingham, T	1			
		J. H. Cameron	I	4		Brussels, V		1		
		John Hartley..	II	2		Wr exeter, V.....			1	
		Geo. H. Ashman	II	2	7	Howick			1	
		John Cook	II	2	U. 5	Hullett..... . .			1	
		Andrew Scott	II	1	3	Tuckersmith			1	
		E. D. McIntosh	III	1	3	Grey			1	
		Geo. Dobson	II	2	11	"				1
		Thos. G. Shillinglaw.	I	1	9	Tuckersmith				1
		Nellie Beckett.....	III	1	2	Grey				1
		Wm. C Blackwood.	III	1	5	Howick				1
		Alice Duff.	III	1	16	"				1
		A. McAllister	III	2	8	Hullett				1
		Geo. W. Shore	II	1	9	"				1
		Lilla Isbister	II	1	1	Morris				1
		Lizzie McLauchlin...	II	1	4	"				1
		A. McEwen	II	2	U. 4	Turnberry.....				1
		D. Fraser	II	1	9	"				1
J. Elgin Tom	Huron, W.....	S J. A. Boyd	I	8		*Exeter, V.....	1			
		Wm. Baird	III	2	10	Stanley		1		
		Jas H. Tigert	I	2	8	Ashfield.....		1		
		Wm. McKay	II	3		Hensall, V			1	

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APPENDIX C—*Continued.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate.	No. of Teachers.		Name of School.	Class of School. A	B	C	D
J. Elgin Tom	Huron, W.....	Geo. Bloomfield	II	3	5	Stephen	..	..	1	...
		Wm. B. Bagshaw....	II	2	1	"	..	..	1	...
		Allan Bowles	II	1	13	Ashfield	..	..	1	...
		Geo. Baird, Sr	I	1	1	Stanley	..	..	1	...
		Geo. W. Holman	II	2		Bayfield V	..	..	..	1
		W. L. Hackett	III	1	10	Ashfield.....	..	..	..	1
		David W. Evans	II	1	12	"	..	..	..	1
		Mary MacLennan ...	II	1	15	"	..	..	..	1
		Lizzie Trudgeon	II	1	1	Goderich	..	..	..	1
		Chas. A. Tebbutt....	II	1	4	W. Wawanosh.....	..	..	..	1
		Ella M. Patterson ...	II	1	3	Colborne	..	..	..	1
		Sara J. Bell	I	1	7	W. Wawanosh.....	..	..	..	1
		Wm. A. Matheson...	III	1	3	Ashfield	..	..	..	1
Rev. W. H. G. Colles	Kent E	J. A. Bannister, B.A.	I	8		Blenheim, T.....	1	..	..	...
		Henry Kelly, B.A..*	II	4		Bothwell, T	1	..	..	...
		J. D. Campbell.....	I	4	6	Orford	1	..	..	..
		J. G. Cameron	II	4		Thamesville V	1	..	..	...
		J. E. Caldwell	II	2	3 & 4	Orford.....	..	..	1	...
		Mary McCully .. .	III	2	4	Harwich	..	..	1	...
		Jas. C. Black	II	1	6	"	..	..	1	...
		J. R. Newkirk	II	1	9	"	..	..	1	...
		Warth Millar.....	III	1	2	"	..	..	..	1
		Ollie A. Drewery	III	2	2½	"	..	..	..	1
		Geo. Riseborough....	I	1	3	"	..	..	..	1
		Florence Nichol.....	III	1	5½	"	..	..	..	1
		Alex Clark	III	1	8	"	..	..	..	1
		W. J. Robinson	II	2	2	Howard	..	..	..	1
		Blanche Campbell ..	III	1	7	"	..	..	..	1
		Eliz. Gesner	II	1	12	"	..	..	..	1
		Mary E. Colles .	II	1	13	"	..	..	..	1
		W. Doherty	III	1	14	"	..	..	..	1
		Louise Jarvis.....	II	1	5	Zone	..	..	..	1
		D. Buchanan.....	III	1	2	Orford.....	..	..	..	1
		Flora Gesner	II	1	5	"	..	..	..	1
		G. Cochrane	III	1	3	Camden	..	..	..	1
		Margt. Scurrah	II	1	8	"	..	..	..	1
R. Park.....	Kent, W	E. E. Dadson	I	10		*Wallaceburg, T	1	..	..	...
		G. A. Millar	I	8		Dresden, T	1	..	..	...
		W. A. Hutton	II	3		Tilbury, V	..	..	1	...
		Gordon Stewart . ..	III	1	11	Dover	..	..	1	...
		Lydia Broadbent	III	1	7	Raleigh	..	..	1	...
		S. C. Irwin	II	2	5	Tilbury, E.....	..	..	1	...
		T. N. Leigh	II	1	13	Dover	..	..	1	...
		W. C. Dainty	II	3	U. 4	Romney.....	..	..	1	...
		Angus McLean ..	III	1	3 S	Tilbury, E	..	..	1	..
		Margaret McCornock	II	1	U. 3	Raleigh	..	..	1	...
		Fred W. Tobey	III	1	3	Chatham	..	..	..	1
		Mary E. Wilson	III	1	7	"	..	..	..	1
		Lizzie McCoig	III	1	8	"	..	..	..	1
		Wm. S. Bell	II	1	8	Dover	..	..	..	1
		H. M. Fleming	III	1	5	Raleigh	..	..	..	1
		Edith Reycraft	III	1	8	"	..	..	..	1
		Flora B. Campbell ..	II	1	10	"	..	..	..	1
		Lizzie Wilson . ..	II	1	2	Tilbury, E	..	..	..	1
		Mia Farquharson ...	II	1	3	N. Tilbury, E.....	..	..	..	1
		Lizzie Stewart	II	1	3	M. "	..	..	..	1
		Cassie M. Hill.	III	1	4	Tilbury, E	..	..	..	1
C. A. Barnes, M.A.	Lambton, E....	A. I. Walker	I	4		Alviston, V	1	..	..	...
		Neil McLean	II	4		Wyoming, V.....	..	..	1	...
		Robt. Campbell.... ..	II	2	5	Euphemia	..	..	1	...
		J. W. Walker	II	1	15	Warwick	..	..	1	..
		Chas. E. Johnson ...	II	1	3	Plympton	..	..	..	1
		Emma Grant	III	1	7	Brooke	..	..	..	1
		S. D. Pepper	II	1	5	Bosanquet	..	..	..	1
		Jarvis Henry ..	II	1	3	Dawn	..	..	..	1
		Miss M. Campbell ...	II	1	5	Plympton	..	..	..	1
		Janet McKinlay	II	1	6	"	..	..	..	1
		N. J. Kearney	II	2		Thedford V	..	..	..	1
		C. H. Barnes.....	I	2		Arkona, V.....	..	..	..	1

APPENDIX C.—*Continued.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate.	No. of Teachers.	Name of School.	Class of School. A	B	C	D
D. D. Moshier, B.A.									
B. Paed	Lambton, W ...	David Hicks, B.A ..	I	6	Oil Springs, V.....	1	..	..	..
		Thos. Jarrott	II	2	18 Moore.....	..	..	1	..
		Jas. J. Wilson.	II	2	17 Enniskillen.....	..	..	1	..
F. L. Mitchell, M.A.	Lanark	Robt. Beatty	II	5	Lanark, V	1	..	..	..
		Mima Ellis	II	3	4 Pakenham	..	1	..	..
		Mrs. E. J. Foley	II	2	12 Bathurst	..	..	..	1
		Miss McMurrick	III	1	8 Montague	..	..	..	1
Wm. Johnston, M.A.	Leeds No. 1 ...	Jas. Montgomery....	II	3	4 N. Crosby	..	..	1	..
		W. D. Hannah	I	3	Newboro', V.....	..	..	1	..
		R. Hanna	II	2	5 S. Crosby	..	..	..	1
		M. Alford	II	1	4 Bastard	..	..	..	1
T. A. Craig	Leeds & Grenv'le	E. J. Withey, B.A ..	...	5	Merrickville, V.....	1	..	..	..
		Samuel Mars	II	2	15 Edwardsburg ...	..	..	1	..
		T. E. Blanchard	II	2	17 Augusta.....	..	..	1	..
		Geo. Conley	II	6	Cardinal, V	..	..	1	..
		W. J. McLachlan....	II	2	1 Oxford	..	..	1	..
F. Burrows	Lennox & Addington.....	J. H. Davidson, B.A	I	3	Bath, V	1	..	..	..
		M. E. Gibson	III	1	4 Amherst Island.....	..	..	..	1
		H. M. Mallory	III	1	5 Ernesttown	..	..	..	1
W. W. Ireland, B.A	Lincoln	Robt. Hanham	III	1	11 Gainsboro	..	..	..	1
P. J. Thompson, B.A.	Middlesex, E...	Geo. Ramsay.....	III	1	1 London	..	..	1	..
		Blanche Mills	I	2	4 N. Dorchester	..	..	1	..
		Geo. Dale	II	2	6 McGillivray	..	..	..	1
		Flora McColl	II	1	10 Westminister	..	..	..	1
		Bessie Hobbs.....	II	1	3 London	..	..	..	1
		Elsie Waugh	II	1	14 Westminister	..	..	..	1
		John C. Robson	II	2	5 "	..	..	..	1
		Annie Hardie.....	I	2	7 Biddulph	..	..	..	1
		Neil J. McKee	III	1	12 N. Dorchester	..	..	..	1
		Mary Sharp.....	II	1	7 London	..	..	..	1
		Alfred E. Marks	III	1	13 "	..	..	..	1
		W. MacKerracher ...	II	2	17 "	..	..	..	1
		Frances Quance... ..	III	1	19 "	..	..	..	1
		Ernest Fuller.	III	1	8 McGillivray	..	..	..	1
H. D. Johnson	Middlesex, W ..	Ben Parker.....	II	1	U. 1 & 2 Adelaide	..	..	1	..
		Chas. George.....	II	1	7 Lobo	..	..	..	1
		David A. Ross	II	1	6 Adelaide	..	..	..	1
		John Cowie..... ..	II	1	10 "	..	..	..	1
		Chas. A. Campbell . .	III	1	U. 9 Lobo	..	..	..	1
		Peter McKechan	II	1	4 Metcalfe	..	..	..	1
		D. G. Galbraith	III	1	U 8 Ekfrld	..	..	..	1
		D. F. McLachlan ..	II	1	U. 17 Mosa..	..	..	..	1
J. J. Wadsworth, M.A	Norfolk	J. A. Irwin	I	4	Delhi, V	..	1	..	..
		H. J Alexander	III	2	6 Charlotteville	..	..	1	..
		E. Hagerman	III	2	18 Charlotteville	..	..	1	..
		M. A. Jonson	I	1	23 Townsend	..	..	..	1
		H. M. Hindson.....	II	1	14 Windham	..	..	..	1
		R. A. Catherwood ...	II	2	10 "	..	..	..	1
		Mabel Scott	III	1	12 Townsend	..	..	..	1
A. Odell	Northumberland	Wm J Wright, M.A	I	4	2 Percy or Warkworth	1	..	..	..
		Edith Robertson ...	II	1	5 Percy	..	..	..	1
		Harrison Carr	II	1	1 Percy & 22 Cramahe	..	..	..	1
		E. A. Wessels	II	2	21 Murray	..	..	..	1
Jas. McBrien	Ontario, N	R. J. Johnston	II	4	Cannington, V.....	..	1	..	..
		J. Givens.....	II	3	Beaverton, V	..	..	1	..
		Wm. Fallowdowne ..	II	3	13 Brock	..	..	1	..
		Marie Cadotte	I	1	7 Mara	..	..	1	..
		Mary MacLean.....	II	1	3 Uxbridge	..	..	1	..
		Ada Holtby	II	2	7 Uxbridge	..	..	1	..
		T. P. Hart	II	1	4 Mara	..	..	1	..
		Patrick Malone	II	1	6 Mara	..	..	1	..
		Laura Weir.....	II	1	1 Thorah	..	..	1	..
		Wm. A. Cameron ...	II	1	2 Thorah	..	..	1	..
		Ernest Middleton....	II	1	10 Brock.....	..	..	1	..
		Mary Bradley	III	1	2 Ram	..	..	1	..
		Amanda Shier .. .	II	1	3 Scott	..	..	..	1

APPENDIX C—*Continued*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate	No. of Teachers.	Name of School.	Class of School. A	B	C	D
Jas. McBrien	Ontario, N	E. Blanchard	III	1	8 Scott				1
		Jas. Quigley	II	1	2 "				1
		E. Fov	I	1	2 Brock				1
		Jesse McCuaig	II	1	1 Mara				1
		J. M. Kelly	II	1	3 "				1
		J. Winters	II	1	10 "				1
J. Waugh, B.A., D. Paed.	Ontario, S	A. J. McCulloch	III	1	7 Whitby			1	
		E. Bradley	II	2	6 E. Whitby				1
		W. F. Flummerfelt	II	2	15 Pickering				1
		Wm. Eadie	II	1	9 "				1
		Florella G. Pearce	II	1	U. 2 "				1
		W. W. Noble	II	2	8 "				1
W. Carlyle	Oxford	G. E. Pentland	I	5	Norwich, V	1			
		Jas. W. Fraser, B.A.	II	3	Embro, V		1		
		Chas. Garthwaite	II	3	6 S. Norwich		1		
		G. E. Trueman	III	3	24 Blenheim		1		
		S. C. Woodworth	I	3	U. 21 "		1		
		C. Cameron	I	4	U. 13 E. Zorra		1		
		P. H. Hendershot	II	2	U. 3 N Norwich			1	
		M. B Hugill	II	2	5 Dereham			1	
		Jas. Little	I	3	11 Blenheim				1
A. Embury	Peel	K. A. McKenzie	I	4	Bolton, V	1			
		Minnie Bateman	II	2	U. 21 Toronto and 2 Toronto Gore			1	
		Adam C. Wilson	II	2	15 Caledon			1	
		L. D. Sanderson	I	2	2 Toronto			1	
		Nellie Higginson	II	2	8 Caledon			1	
Wm. Irwin, B.A	Perth	James Smith	II	3	Milverton, V		1		
		S. C. Stoodley	II	1	8 Downie				1
		Jas. Stewart	II	2	U. 2 Ellice and Downie				1
		Joan Hamilton	II	1	2 N. Easthope				1
		R. H. Cowie	II	2	U. 4 Fullerton				1
J. Coyle Brown	Peterborough	W. A. Evans	I	5	Lakefield, V		1		
		Thos. J. Wallace	II	2	4 Otonabee			1	
		Harold C. Kindred	II	4	Havelock, V			1	
W. J. Sunmerby	Prescott and Russell.	S. A Hitsman	I	3	2 Russell			1	
		C M. Rowe	II	2	Rockland, V			1	
G. D. Platt, B.A	Prince Edward	John A. Rundle	I	2	11 Ameliasburg		1		
		W. R. McKibbon	II	2	17 Hillier		1		
		J. F. Harvey	III	2	Wellington, V		1		
		W. J. Osborne	I	2	7 Hallowell		1		
		Mrs. V. Palen	II	1	6 N. Marysburgh				1
		M. B Peterson	III	1	4 Sophiasburgh				1
		Miss M. B. Rorke	II	1	6 Athol				1
R. G. Scott, B.A	Renfrew	G. A. Lucas B.A.	I	3	Eganville, V		1		
		Geo E. Fletcher	III	2	6 Ross			1	
		John Johnston, B.A.	III	2	5 Bagot			1	
		Geo. R. Wood	II	2	7 Westmeath			1	
		Wm. Sullivan	III	1	3 Admaston				1
		Carrie Jack	III	1	7 "				1
		Jos. Sheahan	III	1	4 Ross				1
		Joseph Belisle	III	1	3 Bagot				1
		John E. McConnell	II	1	2 Brudenell				1
I. Day, B.A	E. Simcoe and W. Muskoka.	Sarah Tewkesbury	II	3	7 Medonte			1	
		R. G. Nesbitt	II	4	12 Tay				1
		Chas. Bowes	III	1	1 Humphrey				1
		Edna E O'Brien	III	1	9 Stephenson				1
J. C. Morgan, M.A	Simcoe, N	A. McKee	I	11	Midland, T	1			
		J. Slaughter	II	4	5 Flos		1		
		I. J. McInerney	II	6	Penetanguishene, T			1	
		N. S. Kenny	II	4	Prot. Sep. School, Penetanguishene			1	
		M. Johnstone	II	1	3 Sunnidale			1	
		T W. Walker	II	1	4 "				1
Rev. Thos. McKee	Simcoe, S. W	Wm. Sparks	I	6	*Alliston, T	1			

* In all schools marked with an asterisk, two of the teachers devote all their time to Continuation Class work.

APPENDIX C.—*Continued.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate	No. of Teachers	Name of School.	Class of School. A	B	C	D
Rev. Thos. McKee..	Simcoe, S. W ..	Jas. A. McPherson ..	II	4	Beeton, V.....	1	..	..	..
		Jas. H. Brown	I	4 5	Essa	1	..	..	..
		Thos. Gowan	II	4	Creemore, V.....	1	..	..	..
		A. N. Scarrow	I	6	*Stayner, T	1	..	..	..
		T. E. Langford, M.A.	I	4	*Tottenham, V.....	1	..	..	..
		Geo. L. Thompson...	I	2 10	E-sa	..	1	..	..
		Geo. Sutherland	II	2 14	Nottawasaga	..	1	..	..
		Jas. Ed Holt..... ...	II	2 10	W. Gwillimbury....	..	1	..	..
		Albert Williams .	I	2 3	Nottawasaga	..	..	1	..
		Chas Deering	II	2 10	Inni-fil	..	..	1	..
		John A. Corbett	II	1 9	"	..	..	1	..
		Thos. Irwin	II	1 4	Tossorontio	..	..	1	..
		H. B. McCracken....	I	1 6	Essa	..	..	1	..
		Elmer Thompson ..	II	2 7	"	..	..	1	..
		A. Creery	II	1 6	Adjala	..	..	..	1
		Genevieve McGeoy ..	II	1 4	"	..	..	..	1
		Ethel Hammel.....	III	1 3	"	..	..	..	1
		Willard Fif	III	1 1	Essa	..	..	..	1
		Wm. Kirkpatrick....	III	1 7	Innisfil	..	..	..	1
		James Spence	III	2 5	Nottawasaga	..	..	..	1
		Alfred Green.....	III	1 19	Tecumseth	..	..	..	1
		Jessie Porter	I	1 6	Tossorontio	..	..	..	1
		Jno. M. McGuire ...	III	1 8	"	..	..	..	1
		Wm. A. Atkinson ..	III	1 22	Nottawasaga	..	..	..	1
A. McNaughton....	Stormont.....	Eardly S. Coons	I	3 14	Roxborough	1	..	..	..
		Jas. Froats	I	3 3	Finch	1	..	..	..
		R. A Baker.....	III	3 4	Osnabruck	..	..	1	..
		Edward J. Cleary....	III	2 5	Cornwall	..	..	1	..
		Geo. A. Moore	II	1 5	Osnabruck	..	..	1	..
		Willis Sheets	II	2 3	"	..	..	1	..
		Geo. S. Mattice	II	1 9	"	..	..	..	1
J. H. Knight.....	Victoria, E.....	Albert E Bryson....	II	4	Bobcaygeon, V	..	1	..	..
H. Reazin	Victoria, W., etc.	W. C. Sheer, B.A....	I	8	Bracebridge, T ...	1	..	..	..
		B. H. Mayher. ...	II	6	Fenelon Falls, V....	..	1	..	..
		Murray Wilson . .	II	2	Woodville, V.....	..	..	1	..
		Chas. Lapp	II	2 8	Mariposa	..	..	1	..
		Ed. Mosgrove	II	2 8	Eldon	..	..	1	..
		Thomas Mark	II	2 4	Fenelon	..	..	..	1
Thomas Pearce	Waterloo.....	I. G. Baker	II	6	Elmira, V	..	1	..	..
		David Harper	II	2 1	Wilmot	..	..	1	..
		R. N. Shortill	II	4	Ayr, V.....	..	..	..	1
		J. D. Ramsay	II	8	Hespeler, T.....	..	..	..	1
J. H. Ball, M.A....	Welland	D. W. McKay	I	4	Port Colborne, V ...	..	1	..	..
		C. E. Hansel	II	4	Bridgeburg, V	..	1	..	..
		Alex. Ross.....	II	3	Fort Erie, V.....	..	1	..	..
		Wm. H. Metcalf ..	II	3 11	Bertie	..	1	..	..
		Wm. B. Buckner....	III	2 5	Humberstone	..	..	1	..
		Miss M. Edmondston.	II	1 3	Pelham.....	..	..	..	1
		Jas H. Wright	III	1 3	Thorold	..	..	..	1
		Miss C. M. Augustine.	II	1 6	Pelham	..	..	..	1
D. Clapp, B.A.....	Wellington, N..	G. A. Campbell. ...	II	4	Drayton, V..... ...	1	..	..	..
		D. Forsyth	II	8	Palmerston, T	1	..	..	..
		John A. Gray.	II	3	Clifford, V	..	1	..	..
		Mary Duncan . .	II	2 12	Maryboro'	..	1	..	..
		Clarence Long.....	II	2 2	Peel	..	..	1	..
		Jas. Corrigill	I	2 7	"	..	..	..	1
		Helen Turnbull	II	1 17	Maryboro'	..	..	..	1
J. J. Craig, B.A....	Wellington, S.	H. N. Awrey. ..	II	4	Erin, V	1	..	..	..
		John Strachan	II	3 9	Eramosa	..	1	..	..
		W. H. Rowan ...	II	2 6	Erin	..	..	1	..
		W. F. McKenzie....	II	1 3	Guelph	..	..	1	..
		N. L. Smith	II	1 2	"	..	..	1	..
		W. L. Eveidge	II	1 6	W Garafraxa	..	..	1	..
		W. O. McKinnon ...	III	1 8	Eramosa	..	..	..	1
		A. F McKenzie	II	1 $\frac{1}{2}$	Guelph	..	..	..	1

* In all schools marked with an asterisk, two of the teachers devote all their time to Continuation Class work.

APPENDIX C.—*Concluded.*

Name of Inspector.	Jurisdiction.	Name of Principal.	Professional Certificate.	No. of Teachers.	Name of School.	Class of School. A	B	C	D
J. H. Smith	Wentworth	Chas. H. Stuart	II	3	5 Ancaster		1		
		J. S. Jamieson	III	2	7 Beverly		1		
		R. J. Vance	II	2	3 Binbrook			1	
		C. E. Kelly	I	3	3 Saltfleet			1	
		Lillie Reid	III	1	6 E. Flamboro'				1
		Jas. J. Carroll	II	2	2 Glanford				1
		H. R. Henderson	III	2	9 W. Flamboro'				1
		James E. Stewart	II	2	7 "				1
		Frank McCollum	I	2	6 Ancaster				1
A. B Davidson, B.A.	York, N.	T. A Colquhoun	I	3	14 King	1			
		Wm Park	III	3	Sutton, V				1
		J. H. Precious	II	2	2 King	1			
		Mary E Cook	II	1	8 Whitchurch				1
		Jas. Bruels	II	1	4 N. Gwillimbury				1
		Sarah Earle	III	1	6 "				1
D. Fotheringham	York, S.	W L. Kidd	I	4	Woodbridge, V	1			
		J. W. Johnston, B.A.	I	6	East Toronto, V			1	
		J. W. English	I	3	1 Etobicoke			1	
D. McCaig	Algoma, etc	T. H. Roberts, B.A.	I	19	* Rat Portage, T	1			
		L. A Green, B.A.	I	15	* Sault Ste. Marie, T.	1			
		D. M. Christie	I	4	1 Plummer Additional		1		
		J. W. Milne	I	4	Thessalon, T				1
		John B. Stewart	II	2	1 Chapleau				1
		H. E. Manning	II	2	Fort Frances				1
		R. C. Robinson	I	4	Keewatin			1	
Wm. Houston, M.A.	Manitoulin Island, etc.	R. O White	I	4	Gore Bay, T.	1			
		R. D. Fleming	II	3	Little Current, T			1	
Rev. G. Grant, B.A.	W. Parry Sound & N. Nipissing	A. M. Currie	I	11	* Parry Sound, T	1			
		J. B. McDougall, B.A	I	8	* North Bay, T.	1			
		J. W. Donnell	II	2	Mattawa, T				1
		Jno. Urquhart, B.A.	I	3	Sturgeon Falls, T				1
		Arthur D. Scott	III	1	U 1 Spence				1
		Beecher Cryderman	III	2	U 1 Chapman				1
J. F. White	R.C.S.S.'s Central Ontario	R. L Gaughan	II	2	3 Mara			1	
Michael O'Brien	R. C. S. S's, E. Ontario.	Sr. Ernestina		4	Evansville, V	1			
		Sr. St. Andrew		3	4 N. Crosby		1		
		Wm. Gallagher	II	4	Mattawa, T			1	
W. Prendergast, B.A	R. C. S. S's, W. Ontario.	Sr. M. Ethelbert		5	Amherstburg, T	1			
		Sr. M. Baptist	II	3	1 E. Sandwich				1
		Lizzie H. Warde	II	1	5 Raleigh				1
Totals						55	51	137	188

* In all schools marked with an asterisk, two of the teachers devote all their time to Continuation Class work.

APPENDIX D.—*ADMISSION OF CANDIDATES TO COLLEGIATE INSTITUTES AND HIGH SCHOOLS.*

Collegiate Institutes.	Entrance examination, June, 1901.	
	Examined.	Passed.
Aylmer	98	67
Barrie	121	84
Brantford	165	136
Brockville	100	88
Chatham	141	123
Clinton	69	59
Cobourg	76	69
Collingwood	62	38
Galt	124	111
Goderich	82	79
Guelph	144	120
Hamilton	529	409
Ingersoll	57	44
Kingston	243	203
Lindsay	94	72
London	377	332
Morrisburg	97	52
Napanee	115	77
Niagara Falls	54	48
Orillia	92	67
Ottawa	344	279
Owen Sound	109	92
Perth	96	78
Peterborough	172	87
Ridgetown	63	55
St. Catharines	89	78
St. Mary's	107	85
St. Thomas	176	110
Sarnia	138	96
Seaforth	67	50
Stratford	223	165
Strathroy	130	69
Toronto (Harbord St.)	288	159
" (Jameson Ave.)	151	98
" (Jarvis St.)	217	121
Whitby	61	48
Windsor	159	97
Woodstock	184	132
Total	5,574	4,166

High Schools.	Entrance Examination, June, 1901.	
	Examined.	Passed.
Forest	29	24
Fort William	29	21
Gananoque	67	38
Georgetown	39	28
Glencoe	73	55
Gravenhurst	56	44
Grimsby	22	16
Hagersville	35	32
Harriston	43	34
Hawkesbury	32	17
Iroquois	68	40
Kemptville	59	34
Kincardine	53	28
Leamington	46	27
Listowel	102	75
Lucan	82	66
Madoc	74	57
Markham	103	78
Meaford	57	46
Mitchell	73	60
Mount Forest	54	37
Newburgh	95	63
Newcastle	13	11
Newmarket	79	48
Niagara	32	19
Niagara Falls South	46	40
Norwood	49	45
Oakville	42	34
Omemee	42	30
Orangeville	55	26
Oshawa	77	60
Paris	60	49
Parkhill	91	61
Pembroke	115	70
Petrolea	97	69
Picton	133	85
Port Arthur	38	26
Port Dover	34	23
Port Elgin	70	61
Port Hope	73	52
Port Perry	54	37
Port Rowan	33	25
Prescott	60	29
Renfrew	113	66
Richmond Hill	61	34
Simcoe	98	63
Smith's Falls	68	58
Smithville	37	27
Stirling	50	27
Streetsville	22	15
Sydenham	74	52
Thorold	67	37
Tilsonburg	69	38
Toronto Junction	91	56
Trenton	34	27
Uxbridge	69	36
Vankleekhill	80	52
Vienna	50	28
Wallaceburg	55	44
Wardsville	12	9
Watertown	35	32
Waterford	63	52
Watford	48	33
Welland	46	42
Weston	48	39
Wiarton	47	38
Williamstown	50	27
Total	5,699	4,072

High Schools.

Alexandria	58	42
Almonte	50	41
Arnprior	60	47
Arthur	58	48
Athens	109	82
Aurora	46	32
Beamsville	34	30
Belleville	230	179
Berlin	119	102
Bowmanville	45	39
Bradford	43	32
Brampton	43	33
Brighton	42	32
Caledonia	43	25
Campbellford	77	48
Carleton Place	85	61
Cayuga	43	29
Colborne	25	22
Cornwall	133	90
Deseronto	37	31
Dundas	59	43
Dunnville	64	53
Dutton	64	54
Elora	42	30
Essex	39	33
Fergus	80	52

APPENDIX D.—*Continued.*

Other Schools.	Entrance examination, June, 1901.		Other Schools.	Entrance examination, June, 1901.	
	Examined.	Pas-ed.		Examined.	Passed.
Aberfoyle	29	23	Emo	2	2
Acton	24	13	Embro	38	22
Alliston	50	31	Erin	28	21
Alvinston	47	29	Exeter	44	31
Ameliasburg	32	11	Fenelon Falls	40	30
Amherstburg	48	36	Fingal	59	44
Ancaster	47	34	Flesherton	36	23
Angus	17	11	Florence	34	15
Apsley	1	1	Fordwich	20	7
Arkona	22	11	Fort Frances	7	4
Avonmore	41	24	*Gore Bay	.....	.....
Ayr	26	21	Grand Valley	30	16
Bailieboro	24	17	Hall's Bridge	6	5
Bancroft	16	5	Hanover	20	17
Bath	38	21	Harrow	21	14
Bayfield	13	9	Hastings	19	15
Belle River	31	22	Havelock	13	8
Beaverton	27	15	Hensall	26	14
Beeton	12	10	Heathcote	13	6
Belmont	57	44	Hepworth	18	13
Bethany	21	14	Highgate	22	19
Binbrook	35	28	Hillsdale	23	19
Blackstock	16	6	Horning Mills	14	7
Blenheim	56	53	Huntsville	31	22
Blyth	31	20	Jarvis	30	24
Bobcaygeon	18	10	Keene	33	26
Bolton	27	13	Kingsville	57	29
Bothwell	16	14	Kintail	35	22
Bracebridge	35	28	Kirkfield	8	4
Bridgeburg	46	30	Lakefield	69	35
Bridgden	36	19	Lanark	50	27
Bruce Mines	16	10	Lancaster	23	16
Brussels	66	55	Lion's Head	13	6
Burford	25	17	*Little Current	.....	.....
Burk's Falls	26	18	Little Britain	13	10
Burlington	30	24	London East	149	123
Burritt's Rapids	7	3	Lucknow	33	21
Cannington	32	20	Magnetawan	13	10
Cardinal	22	12	Markdale	24	16
Carp	32	28	Marshville	14	12
Castleton	13	11	Marsville	5	..
Chapleau	3	2	Mattawa	18	6
Charleston	27	9	Maxville	47	25
Chatsworth	17	5	Merlin	33	29
Chesley	49	30	Merrickville	42	17
Clifford	18	11	Metcalfe	37	27
Comber	24	9	Midland	24	13
Cookstown	36	23	Milldmay	23	16
Courtright	23	10	Millbrook	36	24
Creemore	24	13	Milton	84	51
Credition	24	15	Millverton	22	22
Crossbill	14	9	Minden	10	9
Cumberland	21	14	Moorefield	15	12
Delhi	29	21	Mount Hope	32	17
Delta	31	19	Newboro	34	19
Dickinson's Landing	39	31	New Hamburg	20	12
Drayton	39	32	Neustadt	4	3
Dresden	44	42	North Augusta	14	4
Drumbo	14	7	North Bay	38	26
Dryden	3	1	North Lancaster	17	11
Dundalk	35	19	Norwich	44	38
Dungannon	32	21	Oakwood	17	9
Durham	54	40	Oil Springs	24	18
Eganville	48	33	Orono	20	13
Eglinton	23	19	Otterville	18	16
Elmira	13	9	Paisley	63	39
Elmvale	26	14	Pakenham	21	17

* No report received.

APPENDIX D —*Concluded.*

Other Schools.	Entrance examination, June, 1901.		Other Schools.	Entrance examination, June, 1901.	
	Examined.	Passed.		Examined.	Passed.
Palmerston	20	16	Teeswater	49	35
Parry Sound	32	25	Thamesville	41	33
Pelee Island	4	3	Thedford	31	12
Pelham S. S. No. 2	29	21	Thessalon	11	5
Penetanguishene	27	19	Thornbury	46	31
Plantaganet	21	16	Tilbury	22	22
Plattsville	11	9	Tiverton	18	14
Port Colborne	44	40	Tottenham	29	21
Port Dalhousie	25	23	Tweed	37	30
Port Stanley	29	22	Uptergrove	31	22
Princeton	29	13	Wallaceburg	53	48
Powassan	39	26	Warkworth	35	32
Raleigh S. S. No. 10	15	15	Waubaushene	30	25
Randwick	5	1	Wellington	15	10
Rat Portage	60	34	West Lorne	24	23
Richmond	43	33	Westport Separate School	30	14
Ridgeway	16	15	Winchester	135	62
Ripley	22	20	Wheatley	20	17
Rockton	27	17	Wilkesport	21	12
Rockwood	21	16	Wingham	72	65
Rodney	37	31	Woodbridge	18	10
Rosemont	15	8	Woodville	22	14
Russell	25	18	Wolfe Island	28	15
St. George	14	9	Wooler	16	9
St. Helen's	10	7	Wroxeter	14	13
Sault Ste. Marie	48	41	Wyoming	48	30
Schomberg	17	9	Zephyr	20	15
Selkirk	31	21	Zurich	18	13
Sharbot Lake	15	11			
Shelburne	36	22	Total	5,876	3,991
South Finch	46	27			
South Mountain	32	23			
Sparta	29	18	SUMMARY.		
Spencerville	20	6			
Springfield	33	18	Collegiate Institutes	5,574	4,166
Stayner	46	35	High Schools	5,699	4,072
Stoney Creek	23	10	Other Schools	5,876	3,991
Strabane	21	18			
Stroud	16	13	Grand total	17,149	12,229
Sturgeon Falls	8	4			
Sudbury	13	10			
Sutton West	9	7	Comparison with June, 1900.		
Tamworth	32	23			
Tara	37	26			
Tecumseh	22	13	Increase	733	2,655

APPENDIX E—*INSPECTION OF SCHOOLS.*

I. List of Inspectors.

Public School Inspectors.	Jurisdiction.	Post Office.	Salary (travelling expenses included in some cases) for 1900.
			$ c.
M. J. Kelly, M.D., LL.B.	Brant; City of Brantford; Town of Paris	Brantford	1,002 00
W. S. Clendenning	Bruce, East; Towns of Walkerton, Wiarton; Villages of Chesley, Tara	Walkerton	1,388 75
Alexander Campbell	Bruce, West; Town of Kincardine; Villages of Lucknow, Paisley, Port Elgin, Southampton, Teeswater, Tiverton	Kincardine	1,381 25
Robert H. Cowley, B.A.	Carleton: Villages of Hintonburg, Ottawa East, Richmond	Ottawa	1,645 00
Nathaniel Gordon	Dufferin; Town of Orangeville; Villages of Grand Valley, Shelburne	Orangeville	1,425 00
Arthur Brown	Dundas; Villages of Chesterville, Iroquois, Morrisburg, Winchester	Morrisburg	1,040 00
W. E. Tilley, M.A., Ph.D	Durham and S. Monaghan Tp.; Towns of Bowmanville, Port Hope; Villages of Millbrook, Newcastle	Bowmanville	1,550 00
Welburn Atkin	Elgin; Town of Aylmer; Villages of Dutton, Port Stanley, Springfield, Vienna	St. Thomas	1,550 00
D. Chenay	Essex, North (No. 1); Town of Sandwich; Village of Belle River	Windsor	1,000 00
D. A. Maxwell, B.A., LL.B., Ph. D.	Essex, South (No. 2); City of Windsor; Towns of Amherstburg, Essex, Leamington, Walkerville; Village of Kingsville	Windsor	1,103 00
Wm. Spankie, M.D.	Frontenac; Villages of Garden Island, Portsmouth	Kingston	1,512 50
Don'ld McDiarmid, M.D.	Glengarry; Villages of Alexandria, Lancaster, Maxville	Maxville	845 00
Andrew Grier	Grey, East; Town of Thornbury	Thornbury	945 00
Thomas Gordon	Grey, West; Town of Owen Sound	Owen Sound	1,252 50
N. W. Campbell	Grey, South; Towns of Durham, Meaford; Villages of Dundalk, Markdale	Durham	1,273 00
Clarke Moses	Haldimand; Town of Dunnville; Villages of Caledonia, Cayuga, Hagersville	Caledonia	1,205 00
Sylvanus Phillips, B.A.	Haliburton, North East Muskoka, South Nipissing, East Parry Sound; Villages of Burk's Falls, Huntsville, Sundridge	Minden	1,536 00
J. S. Deacon	Halton; Towns of Milton, Oakville; Villages of Acton, Burlington, Georgetown	Milton	1,393 75
William Mackintosh	Hastings, North; Villages of Madoc, Stirling	Madoc	1,500 00
John Johnston	Hastings, South; City of Belleville; Towns of Deseronto, Trenton; Village of Tweed	Belleville	1,595 00
David Robb	Huron, East (N.); Towns of Clinton, Seaforth, Wingham; Villages of Blyth, Brussels, Wroxeter	Brussels	1,390 00
J. Elgin Tom	Huron, West (S.); Town of Goderich; Villages of Bayfield, Exeter, Hensall	Goderich	1,492 50
Rev. W. H. G. Colles	Kent, East; Towns of Blenheim, Bothwell, Ridgetown; Village of Thamesville	Chatham	1,050 00
Robert Park	Kent, West; City of Chatham; Towns of Dresden, Wallaceburg; Village of Tilbury	Chatham	†1,165 00
C. A. Barnes, M.A.	Lambton, East (No. 2); Town of Petrolea; Villages of Alvinston, Arkona, Oil Srings, Watford	London	1,254 00
*D. D. Moshier, B.A., B. Paed	Lambton, West (No. 1); Towns of Forest, Sarnia; Villages Point Edward, Thedford, Wyoming	Sarnia	1,359 00
F. L. Mitchell, M.A.	Lanark; Towns of Almonte, Carleton Place, Perth, Smith's Falls; Village of Lanark	Perth	1,850 00
Wm. Johnston, M.A., LL.B	Leeds and Grenville, No. 1; Town of Gananoque; Village of Newboro'	Athens	1,150 00
Robert Kinney, M.D	Leeds and Grenville, No. 2; Village of Athens	Brockville	1,050 00
T. A. Craig	Leeds and Grenville, No 3; Town of Prescott; Villages of Cardinal, Kemptville, Merrickville	Kemptville	1,060 00
Frederick Burrows	Lennox and Addington; Town of Napanee; Villages of Bath, Newburgh	Napanee	1,380 00

*Appointed in 1901. †Exclusive of Chatham.

List of Inspectors

Public School Inspectors.	Jurisdiction.	Post Office.	Salary (travelling expenses included in some cases) for 1900
			$ c.
W. W. Ireland, B.A ...	Lincoln; Town of Niagara; Villages of Beamsville, Grimsby, Merritton, Port Dalhousie.....	St. Catharines.	1,235 00
P. J. Thompson, B.A...	Middlesex, East; Village of Lucan.....	London	1,150 00
H. D. Johnson.....	Middlesex, West; Towns of Parkhill, Strathroy; Villages of Ailsa Craig, Glencoe, Newbury. Wardsville	Strathroy	1,250 00
J. J. Wadsworth, M.A, M.B.	Norfolk; Town of Simcoe; Villages of Delhi, Port Dover, Port Rowan, Waterford	Simcoe.....	1,500 00
Albert Odell	Northumberland; Town of Cobourg; Villages of Brighton, Campbellford, Colborne, Hastings...	Cobourg.....	1,550 00
James McBrien.....	Ontario, North; Town of Uxbridge; Villages of Beaverton, Cannington, Port Perry.....	Prince Albert ..	990 00
John Waugh, B.A., D. Paed..	Ontario, South; Towns of Oshawa, Whitby.....	Whitby	1,020 00
William Carlyle.....	Oxford; City of Woodstock; Towns of Ingersoll, Tilsonburg; Villages of Embro, Norwich	Woodstock	1,745 00
Allan Embury....	Peel; Town of Brampton; Villages of Bolton, Streetsville.....	Brampton	1,200 00
William Irwin, B.A.....	Perth; Towns of Listowel, Mitchell, St. Mary's; Village of Milverton.....	Stratford.....	1,597 50
J. C. Brown.....	Peterborough; Villages of Ashburnham, Havelock, Lakefield, Norwood.....	Peterborough.	1,320 00
W. J. Summerby	Prescott and Russell; Towns of Hawkesbury, Vankleek Hill; Villages of Casselman, L'Orignal, Rockland.	Russell.....	1,220 00
G. D. Platt, B.A.....	Prince Edward; Town of Picton; Village of Wellington.....	Picton.....	967 50
R. G. Scott, B.A.....	Renfrew; Towns of Arnprior, Pembroke, Renfrew; Village of Eganville	Pembroke.....	2,109 25
J. C. Morgan, M.A.....	Simcoe, North; Towns of Barrie, Midland, Orillia. Penetanguishene.....	Barrie	1,300 00
Rev. Thomas McKee....	Simcoe, South West; Towns of Alliston, Stayner; Villages of Beeton, Bradford, Creemore, Tottenham	Barrie	1,375 00
Isaac Day, B.A.....	Simcoe, East, and West Muskoka; Town of Gravenhurst; Village of Port Carling	Orillia.....	1,390 00
Alexander McNaughton.	Stormont; Town of Cornwall.	Cornwall.....	1,145 00
J. H. Knight.....	Victoria, East; Town of Lindsay; Villages of Bobcaygeon, Omemee.....	Lindsay	781 00
Henry Reazin	Victoria, West, and South-East Muskoka; Town of Bracebridge; Villages of Fenelon Falls, Woodville.	Lindsay	1,451 60
Thomas Pearce.....	Waterloo; Towns of Berlin, Galt, Preston; Villages of Ayr, Elmira, Hespeler, New Hamburg.	Berlin	2,170 00
J. H. Ball, M.A.....	Welland; Towns of Niagara Falls, Thorold, Welland; Villages of Bridgeburg, Chippewa, Fort Erie, Niagara Falls, South, Port Colborne.....	Welland.....	1,280 00
David Clapp, B.A	Wellington, North; Towns of Harriston, Mount Forest, Palmerston; Villages of Arthur, Clifford, Drayton.....	Harriston	1,100 00
J. J. Craig, B.A.....	Wellington, South; Villages of Elora. Frin, Fergus	Fergus	1,100 00
J. H. Smith.....	Wentworth; Town of Dundas; Village of Waterdown.....	Hamilton.....	1,260 00
A. B. Davidson, B.A....	York, North; Towns of Aurora, Newmarket; Villages of Holland Landing, Richmond Hill, Sutton..	Newmarket....	1,110 00
David Fotheringham....	York, South; Towns of North Toronto. Toronto Junction; Villages of East Toronto, Markham. Stouffville, Weston, Woodbridge	Toronto.....	1,215 00
Donald McCaig.....	Districts of Algoma, Thunder Bay, Rainy River; Towns of Collingwood, Fort William, Port Arthur, Rat Portage, Sault Ste. Marie, Thessalon	Collingwood....	1,918 37

List of Inspectors.

Public School Inspectors.	Jurisdiction.	Post Office.	Salary (travelling expenses included in some cases) for 1900
			$ c.
Rev. George Grant, B.A.	Districts of North Nipissing and West Parry Sound; Towns of Mattawa, North Bay, Parry Sound. Sturgeon Falls, Sudbury	Orillia	1,820 00
Wm. Houston, M.A.	Manitoulin Island, etc.; Towns of Gore Bay, Little Current	Gore Bay	730 00
Wm. Tytler, B.A.	City of	Guelph	500 00
W. H. Ballard, M.A.	"	Hamilton	2,000 00
W. G. Kidd	"	Kingston	1,400 00
W. J. Carson	"	London.	1,570 00
John C. Glashan, LL.D.	"	Ottawa	2,000 00
J. B. Grey	"	St. Catharines	
S. Silcox, B.A., B. Paed,	Prin. Co. Model School, City of	St. Thomas	1,200 00
J. Russell Stuart	" " " " "	Stratford	1,000 00
James L. Hughes	City of	Toronto	3,300 00
W. F. Chapman	"	"	2,250 00
*John Connolly	Town of	Brockville	900 00
Duncan Walker, B.A.	"	Peterborough	1,100 00
Thomas Hilliard	"	Waterloo	80 00
		Total	97,642 87

—	Post Office.	Salary 1900.	Travelling expenses 1900.	Total.	—
Separate School Inspectors:		$ c.	$ c.	$ c.	$ c.
James F. White	Toronto	1,925 00	300 00	2,225 00	
Wm. Pendergast, B.A.	Toronto	1,700 00	400 00	2,100 00	
Michael O'Brien	Peterboro'	†566 00	200 00	766 00	
Inspector of Bilingual Training and Elementary Schools:					
Telesphore Rochon, B.A.	Ottawa	†500 00	39 30	539 30	
County Model School Inspector:					
John J. Tilley	Toronto	1,850 00	200 00	2,050 00	
High School Inspectors:					
John E. Hodgson, M.A.	Toronto	2,500 00	402 65	2,902 65	
John Seath, B.A.	Toronto	2,500 00	611 57	3,111 57	
Total				13,694 52	
Grand Total					111,337 39

* Appointed in 1901. † Four months' salary.

II. Diplomas for School Premises, 1901

Name of Inspector.	Jurisdiction.	No. of schools.	No. diplomas.	Name of Inspector.	Jurisdiction.	No. of schools.	No. diplomas.
W. E. Tilley	Durham	102	9	H. D Johnson	W. Middlesex	82	6
N. W. Campbell	S Grey	92	36	W. Carlyle	Oxford	108	12
J. S. Deacon	Halton	61	4	W. Irwin	Perth	111	30
D. Robb	E. Huron	85	7	J. H. Knight	E. Victoria	46	1
J. Elgin Tom	W. Huron	98	14	T. Pearce	Waterloo	85	22
W. H. G. Colles	E. Kent	59	34	D. Clapp	N. Wellington	73	2
C. A. Barnes	No. 2 Lambton	101	12	J. H. Smith	Wentworth	74	23
F. L. Michell	Lanark	122	6	D. Fotheringham	S. York	73	2
P. J. Thompson	E. Middlesex	101	8				

APPENDIX F.—*PROCEEDINGS FOR THE YEAR 1901.*

I. CIRCULARS AND REGULATIONS.

Memorandum.

With some slight verbal changes, the Regulations of 1901 are the same as those of 1896 modified by the provisions of circular 50 of 1899. This consolidation is necessary because of the consolidation of the School Law during the last Session of the Legislature, and in keeping with the usual practice of having the Statutes and the Regulations pertaining to Public and High Schools issued every five years and bound together for the convenience of trustees, inspectors and teachers. It will be observed, therefore, that the courses for the examinations for Junior and Senior Leaving standing, which had been announced for 1901 and 1902, are continued without any modifications. The selections in Literature for those examinations were announced in 1899 in the circular mentioned. The selections for the examinations of subsequent years will be announced in due course Such further amendments as may be called for by educational progress and experience will be made only after very careful consideration and not without giving all parties concerned due notice.

Toronto, September, 1901.

REGULATIONS OF THE EDUCATION DEPARTMENT.

(*Approved, June, 1901.*)

Public Schools.

Sites and School Houses.

1. The site of every Public School shall admit of easy drainage and shall be accessible by the best highways in the section. Its area shall be not less than half an acre, and if the school population of the section exceeds seventy five, the area shall be not less than one acre. The grounds shall be levelled and drained, enclosed by a neat and substantial fence and planted with shade trees. The school house shall be placed at least thirty feet from the public highway.

2. There shall be a well or other means of procuring water, so placed and guarded as to be secure against pollution from surface drainage or in any other way. Every rural school shall be provided with a woodshed.

3 The closets for the sexes shall be under different roofs. They shall be separated by a high, close board fence, their entrances screened from observation, and locked after

school hours. They shall be properly cleansed and disinfected when necessary, and approached by proper walks from the school house so as to be accessible with comfort at all seasons of the year.

4. Where the average attendance of any section for three years exceeds fifty pupils, a school house with two rooms shall be provided. An additional room and teacher shall be required for each additional fifty pupils in average attendance. Every school house shall afford separate entrances with covered porches and suitable cloak rooms for boys and girls.

5 Every school room shall contain a superficial area of at least twelve square feet, and a cubic content of at least 250 feet for each pupil in average attendance. A uniform temperature throughout the room of at least sixty-seven degrees shall be maintained and provision made for a complete change of atmosphere three times every hour. The windows—both sashes—shall be adjusted by weights and pulleys and provided with suitable blinds. Light, where possible, shall be admitted from the left of the pupil.

Furniture and Equipment.

6 Every school house shall be seated with either double or single desks—single desks being preferred The desks shall be fastened to the floor in rows facing the teacher's platform, with suitable aisles between the rows and with passages at least three feet wide between the outside rows and the walls of the school room. Desks according to the following scale shall be considered as meeting all legal requirements :

Age of pupils.	Seats.			Desks.			
	Height.		Slope of back.	Length.		Width.	Height next pupil.
	Front.	Rear.		Double.	Single.		
Five to eight years	11 in.	10½ in	2 in.	36 in.	18 in.	12 in.	22 in.
Eight to ten years	12 "	11½ "	2 "	36 "	18 "	12 "	23 "
Ten to thirteen years	13 "	12½ "	2½ "	36 "	20 "	13 "	24 "
Thirteen to sixteen years	14 "	14½ "	3 "	40 "	22 "	13 "	26 "

7. There shall be one blackboard at least four feet wide, extending across the room in rear of the teacher's desk, with its lower edge not more than two and a half feet above the floor or platform ; and, when possible, there should be an additional blackboard on each side of the room. At the lower edge of each blackboard there should be a trough five inches wide for holding crayons and brushes.

Note.—The following directions for making a blackboard may be found useful :—

(*a*) Where a brick wall is built solid, and also in case of frame buildings, the part to be used for a blackboard should be lined with boards, and the laths for holding the plaster nailed firmly on the boards.

(*b*) The plaster for the blackboard should be composed largely of plaster of Paris.

(*c*) Before and after having receiving the first coat of color it should be thoroughly polished with fine sand paper.

(*d*) The coloring matter should be laid on with a wide, flat varnish brush.

(*e*) The liquid coloring should be made as follows : Dissolve gum shellac in alcohol four ounces to the quart : the alcohol should be ninety-five per cent. strong ; the dissolving process will require at least twelve hours. Fine emery flour with enough chrome green or lampblack to give color, should then be added until the mixture has the consistency of thin paint. It may then be applied in long, even strokes, up and down, the liquid being kept constantly stirred.

8. Every school shall have at least one globe not less than nine inches in diameter, properly mounted; a map of Canada; a map of Ontario; a map of the World and of the Continents; one or more sets of Tablet lessons of Part I. of the First Reader; a standard Dictionary; a Gazetteer; a numeral frame; a suitable supply of crayons and blackboard brushes; an eight-day clock; shelving for baskets; hooks for caps and cloaks; and two chairs in addition to the teacher's chair.

9. The Trustees shall appoint one of their number or some suitable person to keep the school house and premises and all fences, outhouses, walks, windows, desks, maps, blackboards and stoves in proper repair. They shall also provide for whitewashing walls and ceilings if finished in plaster, (or for washing if finished in wood), every year during the summer holidays, and shall employ a caretaker whose duty it shall be to sweep the floors daily, and wash them at least quarterly, and to make fires one hour before the opening of school, from the first of November until the first of May in each year.

10. No public school house or school grounds, unless otherwise provided for in the conveyance to the trustees, shall be used for any other than Public School purposes without the consent of the trustees, and no advertisements shall be posted in any school room or distributed to the pupils unless approved in the same way.

11. The first Friday in May each year shall in rural school sections and in incorporated villages be devoted to the planting of shade trees, the making of flower beds and otherwise beautifying and improving the school grounds. Songs and recitations designed to cultivate greater interest in trees and flowers and in the study of nature shall form part of the exercises of the day.

Duties of Pupils.

12. Every pupil registered in a Public School shall attend punctually and regularly every day of the school year in which his name is so registered. He shall be neat and cleanly in his person and habits, diligent in his studies, kind and courteous to his fellow pupils, obedient and respectful to his teacher, and shall submit to such discipline as would be exercised by a kind, firm and judicious parent.

13. Every pupil on returning to school after absence from any cause shall give orally or in writing to the teacher, a proper reason for his absence. A pupil may retire from school at any hour during the day at the request, either oral or written, of his parent or guardian. A pupil may be suspended who fails or neglects to provide himself with the text books or other supplies required in his course of study, or to pay the fees imposed for such purpose by the trustees.

14. Every pupil shall be responsible to the teacher for his conduct on the school premises or on the way to or from school, except when accompanied by his parents or or guardians or by some person appointed by them on their behalf. Any pupil who injures or destroys school property or furniture may be suspended until the property or furniture destroyed or injured is made good by the parent or guardian of such pupil.

Schools Terms and Organization.

15. Unless otherwise directed by the Trustees, the pupils attending every Public School shall assemble for study at nine o'clock in the forenoon, and shall be dismissed not later than four o'clock in the afternoon. One hour at least shall be allowed for recreation at mid-day, and ten minutes during the forenoon and afternoon terms, but in no case shall the hours of study be less than five hours per day including the recess in the forenoon and afternoon, provided always the Trustees may reduce the hours of study for pupils in the First and Second Forms.

16. Pupils not registered in a Day School may attend a Night School from the 1st of October until the 31st of March. The hours of study in the Night School shall not exceed 2½ hours per session. Pupils shall not be admitted to a Night School who are under fourteen years of age or who attend school during the day. Night Schools shall be subject to the same regulations as Public Schools with respect to the discipline of pupils, the duties and qualifications of teachers and the use of text-books.

17. The course of study for Public Schools shall be taken up in five Forms as hereinafter set forth, and pupils shall be classified by the teacher with respect to their attain-

ments in all the subjects of the Form to which they are assigned or from which they are to be promoted. Pupils who have passed the High School Entrance examination and such other pupils as are considered qualified by the teacher and inspector shall be entitled in both rural and urban schools to receive instruction in the subjects of the Fifth Form, provided that, in a municipality having a High School if resident pupils of the First Form of the High School are not charged fees it will not be deemed obligatory for the Public School to have a Fifth class. The amount of time to be given to any class is to be determined by the teacher, who shall be guided in the matter by the inspector. Subjects of the course of study marked with an asterisk are optional.

18. An optional subject shall be taken only with the consent of the Trustees and the Inspector, and where the teacher is the holder of a First or Second class Certificate and has passed an examination in the option which he undertakes to teach. The Trustees of every rural school shall require Agriculture to be taught in the Fourth and Fifth Forms of the school, and in such cases the Inspector shall report to the Trustees at least annually, the extent of the course taken by the pupils and their standing. Not more than three periods of thirty minutes each shall be given per week to the study of all the optional subjects. In urban schools such instruction may be given in domestic economy and manual training as the trustees deem expedient.

19 In school sections where the French or the German language prevails, the Trustees may, in addition to the course of study prescribed for public schools, require instruction to be given in Reading, Grammar and Composition to such pupils as are directed by their parents or guardians to study either of these languages, and in all such cases the authorized text books in French or German shall be used. But nothing herein contained shall be construed to mean that any of the text-books prescribed for Public Schools shall be set aside because of the use of the authorized text-books in French and German.

Continuation Classes.

20. Under the provisions of The Public Schools Act, the course of study for Continuation Classes shall include the subjects prescribed for Forms I and II of the High School Course. More advanced work of the High School may be taken up if requested by the Trustees and approved by the Public School Inspector. In Class (*a*) the Principal must give regular instruction only to pupils of Form V or to those doing higher work. In the other classes, the teachers must have such qualifications as are approved by the Public School Inspector.

21.—(1) There will be four grades of Continuation Classes, viz.:—(*a*) Schools in which the Principal holds a First Class Certificate (unless occupying the position continuously since April, 1899) and gives regular instruction only to pupils in Form V or to those doing higher work. (*b*) Schools in which there are at least two teachers and a class in regular attendance of at least ten pupils who have passed the High School Entrance examination. (*c*) Schools in which there are at least five; and (*d*) in which there are at least three, who have passed the High School Entrance examination, and are in regular attendance.

(2) No grant will be paid for Continuation Classes unless the Inspector (who shall examine the statements signed, as hereinafter mentioned, by the Principals and Chairmen of the Boards) reports that the obligatory subjects, whether prescribed for examination purposes or not, have received proper attention. The grant will be paid according to the nature and extent of the work done, and not on the results of examinations. In order that a school may obtain the grant, it will be necessary that the minimum number of pupils be enrolled during each month of the full academic year ending in June.

Public School Course of Study.

22. Subject to any instructions issued by the Minister of Education from time to time, requirements of each Form in the Public School shall be as set forth in Schedule A —Public School Courses of Study.

High School Entrance Examinations.

23 At every High School and Collegiate Institute and such other places as may be recommended by the County Council, examinations to be known as High School Entrance examinations to be conducted on the subjects prescribed for the fourth form of Public Schools, shall be held annually. The paper in Arithmetic will include such questions as will specially test the accuracy of the candidates in the simple rules as well as their knowledge of the subject, and the paper in Dictation will call for the study of the authorized spelling book. The County Council may impose a fee not exceeding one dollar upon each county pupil writing at the Entrance examination. Boards of trustees may impose similar fees upon resident and non-resident pupils writing for the Entrance examination at High Schools and Collegiate Institutes.

24. Any person intending to write at this examination shall notify the Inspector in whose district he proposes to write, on or before the 1st day of May. Where more examinations than one are held in the same inspectoral division, he shall notify the Inspector of the place at which he desires to be examined. The answer papers of the candidates shall be read by the Board of Examiners constituted under The High Schools Act.

25 The answers of candidates at the Entrance examination shall be appraised according to the following scale, viz. : In Reading, Dictation, Drawing, Writing, 50 each ; in Physiology and Temperance, Composition, History, Geography, 100 each ; in Grammar and Literature, 150 each ; in Arithmetic, 200. Two marks shall be deducted for each misspelled word on the dictation paper, and one mark for every misspelled word in any other paper. Reasonable deductions may also be made for want of neatness.

26. Any candidate who obtains one-third of the marks in each subject and one half of the aggregate marks shall be considered as having passed the examination. The examiners may also award pass standing to candidates who have not made a bad failure in any subject but who have made a high aggregate above the half required, or whose case on account of age, the special recommendations of their teachers, or other circumstances demands special consideration. The decision of the Board of Examiners shall be final with regard to the admission or rejection of any candidate, but the Inspector may submit to the Board for reconsideration the complaint of any candidate or any other person with regard to the examination.

27 In the interval between the annual examinations, pupils may be admitted to a High School by the Minister of Education on the joint report of the Principal of a High School and the Public School Inspector showing the attainments of such pupil, his age, and the reasons for his non-attendance at the Entrance examination prescribed by the Department. No pupil shall be admitted until his case is disposed of by the Minister. The names of such pupils shall be included in the report of the Board of Examiners at the next annual examination.

Public School Leaving Examinations.

28 —(1) Public School Leaving examinations will be held annually at every High School and Collegiate Institute, and at such other places as may be recommended by the Inspector. A person who wishes to write at the Public School Leaving examination must, before the 24th of May, give the necessary notice to the Inspector on a form to be obtained from him. The answer papers will be examined at the Education Department immediately after the examination is held, and a report of the results will be forwarded to the Inspector, or to the High School Principal, if the examination was held at a High School centre. The Board of Trustees where such examination is held shall pay all the cost of the examination, but will receive from the Inspector half the fees paid by candidates.

(2) The Public School Leaving examination will be identical with the examination prescribed for Part I. of Junior Leaving standing. Public School Leaving certificates will be issued by the Public School Inspector to all pupils of Public Schools in his inspectorate who pass the examination of Part I. of Junior Leaving standing. The holders of Public School Leaving certificates granted before 1900, will be entitled to certificates of having passed the examination of Part I of Junior Leaving Standing by passing the

examinations in Arithmetic and Mensuration, Grammar and History, the prescribed percentage on the total of these subjects being also exacted.

29. The Board of Examiners for High School Entrance examinations may admit to a High School, candidates who have failed at a Public School Leaving examination (Part I. Junior Leaving Standing) provided they have made one quarter of the marks on each Entrance examination subject.

High Schools and Collegiate Institutes.

Accommodations and Equipment.

30. The plans of every High School hereafter erected, and the plans and site of every High School hereafter established, shall be subject to the approval of the Minister of Education. In all High Schools established since July, 1891, or to be hereafter established, there shall be a Principal and at least two assistants. No new High School shall be entitled to receive any grant that does not provide at least the amount fixed by the instructions of the Minister of Education with regard to accommodation and the equipment required as the maximum in distributing the Legislative grant to schools with two masters.

31. Any High School may be raised to the status of a Collegiate Institute when it is shown to the satisfaction of the Education Department that the trustees have provided: (*a*) adequate school buildings; (*b*) equipment of the value and character required as the maximum in the case of High Schools with three or more masters; (*c*) four specialists, viz., one in Classics, one in Mathematics, one in Science, one in Modern Languages including English (one of whom or some other member of the staff being also a commercial specialist) and; (*d*) such other Assistants as will secure thorough instruction in all the subjects of the High School course as far as Senior Matriculation into the University of Toronto. A Collegiate Institute may be reduced to the rank of a High School on the joint report of the High School Inspectors, approved by the Education Department.

32. Every High School that complies with the Regulations of the Education Department shall be entitled to the following grants; (*a*) a fixed grant of $375; (*b*) in respect of school accommodation, a maximum of $100 in the case of High Schools with two masters and of $150 in the case of High Schools with three or more masters; (*c*) in respect of equipment, ten per cent. of the total approved expenditure but so as not to exceed $110 in the case of High Schools with two masters or $220 in the case of High Schools with three or more masters: (*d*) in respect of salaries ten per cent. of the expenditure over $1,500 but so as not to exceed $600 in any case; (*e*) such amount *pro rata* in respect of average attendance as may remain unexpended of grant.

33. Every Collegiate Institute that complies with the Regulations of Education Department shall be entitled; (*a*) to a fixed grant of $375; (*b*) to a grant in respect of equipment of $275; (*c*) to a grant in respect of school accommodation of $200; (*d*) to ten per cent. of the expenditure on salaries over $1,500 but so as not to exceed $600; and (*e*) to grant on the basis of average attendance out of any unexpended balance of the Legislative grant.

34. In apportioning the Legislative grant on equipment, the maximum recognized in the case of High Schools with two masters shall be as follows: Library $300; Physical and Chemical Apparatus, $300; Maps and Globes, $50 and models for Drawing, $50; Gymnasium, not including equipment, $400. In the case of Collegiate Institutes and High Schools with three masters the maximum recognized shall be: Library, $600; Physical and Chemical Apparatus, $600; Maps and Globes, $100, and Models for Drawing, $100; Gymnasium, not including equipment, $800.

35. When the value of the Library has reached the maximum herein recognized, ten per cent of the annual expenditure by the High School Board on supplemental reading in English Literature will be allowed. The catalogue of the equipment shall be kept by the Principal of the School and shall be accessible to any officer of the Education Department. The instructions of the Minister of Education in the matter of grading shall be followed in appropriating the grant for buildings and premises. On the report of a High School Inspector, such reductions may be made in the grants payable upon the salaries of the staff, and the character and equipment of the school buildings and their appendages as the Minister of Education may deem expedient.

High School Organization.

36. In every High School or Collegiate Institute the head teacher shall be called the Principal, and the other teachers Assistants. The authority of the Principal of the High School shall be supreme as to all matters of discipline on the school premises, where the Public and High School occupy the same building. The provisions of the Public Schools Act, 1901, and the regulations of the Education Department with respect to the duties of pupils attending a Public School shall apply to teachers and pupils of High Schools.

37. The Principal of a High School or Collegiate Institute shall hold a Principal's Certificate and the Assistants shall hold High School Assistants' Certificates. Special teachers of Music, Drawing, Drill, Gymnastics and Calisthenics, shall possess qualifications satisfactory to the Minister of Education. If, after due advertisment, a High School Board is unable to obtain a qualified Assistant, a temporary certificate may be granted by the Minister of Education for the current half year to a suitable person on the application of the Board.

38. The Principal shall determine the number of pupils to be assigned to each Form and the order in which the subjects in each Form shall be taken up by the pupils. The Principal shall make such promotions from one Form to another as he may deem expedient; he shall also assign the subjects of the course of study among the Assistants.

39 The course of Study in High Schools shall be taken in four Forms. The subjects marked with an asterisk in Forms I and II are optional; all the other subjects are obligatory. Any subject prescribed for a Form may be continued in a higher Form at the option of the Principal. In the case of pupils preparing for University Matriculation or taking the course for a Commercial Diploma, or where the Board introduces Manual Training or any other branch of technical education, on the recommendation of the Principal, less time may be given by the pupils concerned to one or more of the obligatory subjects of the High School course so as to meet as far as practicable the aims of the pupils All pupils shall take the obligatory subjects in Forms I and II and such other subjects in any of the Forms as may be required for Departmental or other examinations, or as may be chosen by their parents or guardian and the Principal of the School, provided that pupils taking the course for a Commercial Diploma shall be required to take only the subjects of such course. Typewriters may be furnished by the Board of Trustees for the use of the pupils. At the option of the Board of Trustees and the Principal, the Art School Drawing Course may be taken in Forms II and III, and Agricultural Chemistry, Physiology and Temperance and Vocal Music may be taken in any Form.

40. Reading shall be taught twice a week during the academic year to all the pupils in each of the sub-divisions of Forms I and II and to the pupils in the other Forms in connection with the English Literature. Writing shall be taught during the first term at least twice a week in the lowest division of Form I, and provision shall be made for additional practice in school hours. Half hour periods separate from the other subjects shall be allotted to Reading and Writing in the Time Table. Where the average number of pupils in a class exceeds twenty-five, the time devoted to Reading and Writing shall be proportionately extended. On the report of High School Inspector a deduction from the Legislative grant may, at the discretion of the Minister of Education, be made of $50 in the case of non-observance in any High School or Collegiate Institute of any part of this Regulation.

41. In High Schools and Collegiate Institutes having a Gymnasium, Drill, Gymnastics and Calisthenics shall be taught in half-hour periods and in organized classes not less than three times a week in each division of Form I, II and III, but shall be optional in Form IV; additional time shall be allowed for practice by pupils under efficient supervision. No pupil shall be exempted from the course prescribed, except upon a medical certificate or on account of evident physical disability. During the months of May, June, September, October and November, the Principal may substitute for Drill, etc, not more than twice a week, such sports and games as he may approve of. In High Schools having no Gymnasium, Drill and Calisthenics shall be taught as the weather may permit; and Gymnastics may be omitted.

High School Course of Study.

42 The details of the course of study in each Form in High Schools shall be as set forth in Schedule B—High School Courses of Study.

Leaving Examinations

43 (1) An examination for students intending to become teachers or to enter a profession will be held annually by the Education Department subject to the conditions hereinafter contained in the High School Course of Study at each High School and Collegiate Institute and at such other centres as may be approved. The examination requirements in the different subjects are set forth in detail in Schedule C. Candidates intending to write should make application to the Public School Inspector before the 24th of May on a Form to be obtained from him.

(2) The papers in Part I of Junior Leaving Standing hereinafter defined, will be different from those set for Matriculation. The Examiners will be expected moreover, to set papers for the purpose of candidates who desire to become teachers, but it is not intended that the questions shall be more difficult than the Regulations have called for since 1896. The papers in Arithmetic and Mensuration and Grammar and Rhetoric shall be submitted to candidates, when writing on Part II of the Junior Leaving Course, in addition to the papers in these subjects taken by candidates when writing on Part I. For the optional groups, the examinations will be equal in difficulty, as near as may be in order that candidates who begin the optional subjects at the same time during their High School Course may have equal advantages in preparing for the examinations.

(3) Each question paper will hereafter be valued at 100. Candidates for Junior and Senior Leaving Standing will be required to make 50 per cent. of the aggregate marks, prescribed for each of the parts into which the examinations are divided, as well as 33⅓ per cent. on each paper. Seventy-five per cent. of the aggregate will be required for Honors. If, after all the answer papers are read, any question paper should be found, by the Board of Examiners, easier or more difficult than intended, the minimum on the paper shall be correspondingly raised or lowered, and the total number of marks correspondingly increased or diminished. Each candidate who makes the required aggregate may be awarded a certificate, even though he should fail to obtain the minimum in a subject, provided he was regarded as fit to pass in that subject by the staff, as shown from the confidential report sent to the Department before the examinations.

44. A certificate of having passed the subjects of Part I of Junior Leaving standing will be accepted for the non-professional requirments for a District Certificate. Junior Leaving standing will be obtained by passing in the prescribed subjects at one examination, or in two Parts (I and II) as defined below, which may be taken in different years In order to obtain Senior Leaving standing, a candidate must pass the examination of Part I of Junior Leaving standing, and in addition the subjects herein prescribed for Parts I and II of Senior Leaving standing which may be taken at one examination or at different examinations.

45. (1) The subjects prescribed for Part I of Junior Leaving standing are the following: Reading, Drawing, Geography, Botany (or Agriculture), Writing with Book-keeping and Commercial Transactions, English Grammar, English Literature, Arithmetic and Mensuration, English Composition, and History. The course in Agriculture will include what is taken up in the authorized text book as far as page 73. The course in the other subjects will be based as heretofore upon the work prescribed in the Regulations for Forms I and II, subject to requirments for examinations hereinafter mentioned, No examination will be held in Reading, English Literature, Drawing, Book-keeping, Botany, or Agriculture, but no name of a student who has not given due attention to these subjects is to be included in the confidential report of the Principal.

(2) No grant to a High School or to a Continuation Class will be paid until the Principal and Chairman of the School Board report that each obligatory subject of the course, whether prescribed for examination or not, has, in their judgement, received due attention on the part of the pupils while attending the school.

(3) It is expected that throughout the course, until pupils have completed what is required for Part I of Junior Leaving standing, at least two half-hour periods per week shall be given regularly to Reading, and an equal time to English Literature. Regarding Drawing, Book-keeping, Botany or Agriculture, at least two half hour periods per week for each of these subjects are to be given regularly to pupils enrolled in Form I of the High School or Form V of the Public School; that is practically during the first year of the course in preparation for Part I of Junior Leaving standing. The subjects of examination for Part I Junior Leaving are, therefore: Geography, Arithmetic and Mensuration, Grammar, Composition and History. Holders of Form I and of Public School Leaving certificates dated prior to 1900 will be entitled to Part I Junior Leaving certificates on passing in Arithmetic and Mensuration, Grammar and History, the prescribed percentage on the total of these subjects being also required A Form II, (or a Part I Form II) certificate, with a Form I certificate, or a Public School Leaving certificate dated prior to 1900 will give Part I of Junior Leaving standing. A Form II or a Part I, Form II) certificate alone will give the same standing, if endorsed and certified to by any High School Principal or Public School Inspector with a statement that the holder has taken the required course in the additional subjets (Drawing, Book-keeping, Reading, etc.

46. All candidates for Junior Leaving Standing must, in addition to the requirments of Part I Junior Leaving take the following subjects of Part II Junior Leaving, viz, English Grammar and Rhetoric, English Composition, English Literature, Ancient History, Arithmetic and Mensuration, Algebra, Geometry, Physics, Latin, and one of the following viz (*a*) Greek, (*b*) French, (*c*) German, (*d*) Chemistry.

A candidate who has already obtained a certificate of having passed Part I of Form II, will not be required to take the papers of Part II Junior Leaving in Arithmetic and Mensuration, English Grammar and Rhetoric, and Physics

47. All candidates for Senior Leaving Standing must, in addition to the requirments of Part I Junior Leaving, take the following Senior Leaving subjects, viz, (in Part I) English Composition, English Literature and Rhetoric, Algebra, Geometry, Trigonometry English and Ancient History, and (in Part II) Latin and Physics, and one of the following groups, viz, (*a*) French and Greek, (*b*) German and Greek, (*c*) French and German, (*d*) French and Chemistry, (*e*) German and Chemistry, (*f*) Biology and Chemistry.

48. A candidate for Senior Leaving Standing who has passed Part I Junior Leaving Standing, shall be awarded a certificate on application to the Education Department of having passed Part II Junior Leaving Standing, not withstanding his failure to obtain Senior Leaving Standing, providing such candidate has obtained one-third of the marks at this examination in the subjects of Senior Leaving Standing.

49. The standing of the third, and fourth years in Arts after a regular course in any University in the British Dominions, will be accepted in lieu of Junior Leaving and Senior Leaving Standing respectively.

50. The course for a Commercial Diploma will consist of two Parts (I and II), to be taken in the same year or in different years. Part I will be the same as Part I of Junior Leaving. Part II will embrace the Commercial subjects mentioned in Schedule C. viz.: Book-keeping and Writing; Commercial Transactions, Business forms and usages, Stenography (Theory); Stenography (Dictation.)

Specialists' Standing

51. Any person who obtains an Honor Degree in the department of English and History, Moderns and History, Classics, Mathematics, or science as specified in the calendars of any University of Ontario and accepted by the Education Department, shall be entitled to the non-professional qualification of a Specialist in such department. A graduate who has not taken an Honor Degree in one of the above courses shall be entitled to the non-professional standing of a Specialist on submitting to the Department of Education a certificate from the Registrar of the University that he has passed, subsequent to graduation, the examinations prescribed for each year of the Honor course of the department in which he seeks to be recognized as a Specialist, and which he has not already passed in his undergraduate course: or any examination which is recommended

by the University as equivalent thereto and accepted as such by the Education Department.

52. Any person who passes an examination in the subjects set forth in Schedule D—course for Commercial Specialists (each paper to be valued at 100), and who is the holder of a High School Assistant's Certificate, obtained either before or after passing such examination, shall be entitled to a Commercial Specialist's Certificate.

Examination and Other Fees.

53. The fees authorized by the Education Department shall be as follows. Candidates for the Entrance Examination, if so ordered by the Board of Trustees or the County Council, $1; Public School Leaving, (Part I. Junior Leaving) $2; Part II. Junior Leaving, $5; Part I. Senior Leaving, $3; Part II. Senior Leaving, $3; Part I. Matriculation, $2; Part II. Matriculation, $5; Junior or Senior Leaving or Matriculation at one examination, $5; Commercial Diploma, each part, $2; Commercial Specialist, $5; For Candidates for examination in one or more subjects only (not exceeding four), for the purpose of completing a course for pass Matriculation into any University or Learned Profession, $2; Tuition County Model School, when so ordered by the Board of Trustees, $5; Kindergarten Assistants, $3; Directors, $5; Examination Normal School, $5; Examination Normal College, $15; Appeals of all kinds, $2. (Fee to be refunded if the appeal is sustained).

Kindergartens.

54. No person shall be appointed to take charge of a Kindergarten in which assistant teachers or teachers-in-training are employed, who has not passed the examination prescribed for a Director of Kindergartens; and no person shall be paid a salary or allowance for teaching under a Director who has not passed the examination prescribed for Directors or assistant teachers. No person shall be admitted to the course of training prescribed for assistants who is not seventeen years of age and who has not Junior Leaving standing, or who has not spent at least three years in a High School. Any person who has taken the equivalent of such a course at some other educational institution may, on the recommendation of the Inspector, be admitted to training with the consent of the Minister of Education. No person shall be admitted to the course prescribed for a Director unless such person has obtained an Assistant's certificate.

55. Any person who attends a Kindergarten for one year and passes the examinations prescribed by the Education Department shall be entitled to an Assistant's certificate. The holder of an Assistant's certificate or the holder of a second-class Provincial certificate shall, on attending a Provincial Kindergarten one year and on passing the prescribed examinations, be entitled to a Director's certificate.

56. The Examination for Directors shall include Psychology and the General Principles of Froebel's System; History of Education; Theory and Practice of the Gifts and Occupations; Mutter and Kose-Lieder; Botany and Natural History; Miscellaneous Topics, including discipline and methods of morning talks, each 100; Practical Teaching, 500; Book-work, 400. There shall also be a sessional examination in Music, Drawing and Physical Culture to be reported by the Principal to the Examiners at the final examination. The examination for Assistants shall include the Theory and Practice of the Gifts, (two papers); Theory and Practice of the Occupations (one paper); Miscellaneous Topics, including the general principles of Froebel's system and their application to songs and games, elementary science, morning talks and discipline (one paper), each paper, 100; Book-work, 400. Any Director sending up candidates to the examination for Assistants' certificates shall certify that the Pease-work and Modelling have been satisfactorily completed.

County and City Model Schools.

57. The Board of Examiners for every County, or the trustees of any city, with the approval of the Minister of Education, may set apart at least one Public School for the professional tralning of third-class teachers. The Principal of such school shall be the holder of a first-class certificate from the Education Department and shall have at least

three years' experience as a Public School teacher. In every Model School there shall be at least three assistants on the staff who shall be the holders of first or second-class certificates. The County Board of Examiners shall distribute the teachers-in-training among the County Model Schools as may be deemed expedient.

58. The Model School term shall begin on the second of September and shall close on the fifteenth day of December. During the term the Principal of the Public School to which the Model School is attached shall be relieved of all Public School duties except the management and supervision of the Public School. The assistants shall give such instruction to the teachers-in-training as may be required by the Principal or by the regulations of the Education Department. There shall be a room for the exclusive use of the teachers-in-training either in the Public School buildings or elsewhere equally convenient.

59. Application for admission to a Model School shall be made to the Inspector not later than the twenty-fifth of August. Any person who has Primary (granted under former Regulations) or a higher standing, or who is considered eligible by the Board of Examiners for a District certificate and who will be eighteen years of age before the close of the term may be admitted as a teacher-in-training. The teachers-in-training shall be subject to the discipline of the Principal with an appeal in case of dispute to the Chairman of the County Board of Examiners. Boards of Trustees may impose a tuition fee, not exceeding $5, on each teacher-in-training.

60. The course of study in Model Schools shall consist of instruction in School Management, to be valued for examination purposes at 100; instruction in the Science of Education, 100; instruction in the best methods of teaching all the subjects on the Public School Course of Study; three papers, 100 each; instructions in the School Law and Regulations so far as they relate to the duties of teachers and pupils, instruction in Reading, School Hygiene, Music and Physical Culture, 50 each; and such practice in teaching as will cultivate correct methods of presenting subjects to a class and develop the art of school government. The final examination of the Education Department will be limited to School Management, the Science of Education, Methods, School Hygiene, and the School Law and Regulations.

61. The Principal of the School shall submit to the Board of Examiners a report with respect to the standing of every teacher-in-training, having regard to his conduct during the session, his aptitude as a teacher, his powers of dicipline and government in the school room and such other qualities as in the opinion of the Principal are necessary to a successful teacher. The Principal shall also report the standing of each teacher-in-training in the subjects of Hygiene, Music and Physical Culture as determined by at least one Sessional examination. These reports shall be considered by the Board of Examiners at the final examination in estimating the standing of the candidates for a certificate in all cases of doubt.

62. During the last week of the Session, the County Board of Examiners shall require each teacher-in-training to teach in the presence of such members of the Board as may be appointed for that purpose, two lessons of twenty minutes each, one of which shall be assigned by the presiding examiner one day before, and the other forty minutes before it is to be taught. The lessons shall be valued at 100 each, shall be appraised by different examiners and shall not be taught in the same Form or in the same subject. The Board of Examiners shall also submit the candidates to practical test of their ability to place upon the blackboard with neatness and despatch any exercise for pupils they may deem expedient. The time allowed for such a test shall not exceed ten minutes and the valuation 50.

63. Any teacher-in-training having at least Primary standing who obtains forty per cent. of the marks assigned to each subject, (including practical teaching) and sixty per cent. of the aggregate shall be awarded a third class certificate valid for three years. At the request of the County Board (when there is a scarcity of teachers) and with the permission of the Minister of Education, a certificate for a shorter period and valid only within the jurisdiction of the County Board, to be known as a District certificate, may be awarded to teachers-in-training who obtain a lower percentage or to such other persons whose non-professional standing will entitle them only to District certificates. The Board may reject any candidate whose scholarship appears to be defective. The decision of the Board with respect to the examination shall be final.

District Model Schools.

64. The Minister of Education may set apart two Public Schools in each of the Districts of Thunder Bay, Algoma, Parry Sound and Nipissing as Model Schools for candidates for District certificates. No school shall rank as a District Model School unless it has a Continuation Class in grade (a) and unless the teaching staff consists of at least three teachers, viz : a Principal holding a first-class certificate and at least one of his assistants holding a second-class certificate. Teachers-in-training at District Schools shall take the course of study and the final examinations prescribed for Public School Leaving examinations. Candidates for teachers' certificates at the District Model School Examinations shall be at least eighteen years of age, and shall take such a course of professional training in the subjects prescribed for County Model Schools as the Inspector of the District may direct.

65. In cities and counties where the French or German language prevails, the Board of Examiners, with the approval of the Education Department, may establish a Model School for the training of teachers of French or German origin ; such schools hold one term each year, viz.: From the first of September to the first of July. The course of study shall be the non-professional course required for a Public School Leaving certificate and the professional course required for a County Model School. The examination in English shall be conducted on the papers prescribed for the Public School Leaving certificate. The examination in French or German shall be limited to Reading Grammar, and Composition and may be both oral and written. The papers in French and German shall be prepared by the Board of Examiners. The Board may submit the teachers-in-training to such an examination on the professional course as it deems expedient.

Provincial Normal and Model Schools.

66. There shall be two Sessions of the Normal School each year ; the first Session shall open on the third Tuesday in January and the second Session on the third Tuesday in August. The Sessions shall close in June and December at such dates as may be determined by the Minister of Education. Any teacher who has at least Junior Leaving standing, and who has taught a Public School successfully for one year, or who, after passing the County Model School examination, has taught under the supervision of the Inspector of a City having a city Model School, six months thereafter, may be admitted as a Normal School student.

67. Before being registered, every student admitted to Normal School shall be examined, in writing or orally, by the Normal School masters upon the books prescribed for the calendar year as the reading course for teachers. Any teacher may be refused registration whose examination does not show a thorough acquaintance with such reading course. The course of study after admission shall be limited and valued for examination purposes as follows :—Psychology and Science of Education, 200 ; History of Education and School Management, each 150 ; Methods of Teaching (four papers), each paper 100 ; Practice Teaching in the Model School, 400.

68. The Principal of the Normal School shall be responsible for the discipline and management of the teachers-in-training. He shall prescribe the duties of the staff subject to the approval of the Minister of Education ; he shall cause Sessional examinations to be held in Temperance, Agriculture, Reading, Writing, Drawing, Music and Physical Culture, each valued at 50 marks, and shall keep a record of the same. The staff shall carry out the instructions of the Principal with regard to discipline, management, methods of study and all matters affecting the efficiency of the Normal School and the progress of the teachers in-training.

69. Teachers in-training shall attend regularly and punctually throughout the Session and shall submit to such discipline and direction as may be prescribed by the Principal. They shall lodge and board at such houses only as are approved by the Principal. Ladies and gentlemen shall not board at the same house and shall have no communication with one another except by permission of the Principal or one of the masters.

70 Teachers in-training shall take a written examination towards the end of each session, to be conducted by the staff covering every subject on the course of study. The standing of candidates at this examination shall be added to the marks prescribed for the

final examination. At the close of each Session candidates shall submit to a written examination conducted by the Education Department. The examiners shall have power to reject any candidate who shows deficiency of scholarship.

71. An examination in practical teaching to be conducted according to the instructions of the Minister of Education shall be required of every teacher-in-training. This examination shall be valued at 200 marks. Any candidate who obtains 34 per cent. of the marks in each subject of the written examinations (the Sessional and final written examination being taken jointly), and 34 per cent. of the marks in teaching (the report of the staff and the report of the special examiners being taken jointly) and 50 per cent. of the aggregate marks shall be entitled to pass standing. Candidates making 75 per cent. of the aggregate marks shall be awarded honors.

72. The terms of the Provincial Model School shall correspond with the Public School terms in cities. The hours of study shall be from 9.30 a.m. to 12 a.m., and 1.30 p.m. to 3.30 p.m. The regulations of the Education Department with regard to pupils and teachers in Public Schools shall apply to the teaching staff and to pupils of the Model School, subject to any modifications that may be made by the Minister of Education from time to time.

73. The Head Master and Head Mistress of each Model School and the Director of the Provincial Kindergarten shall act under the direction of the Principal of the Normal School to which their respective departments are attached, and shall be responsible to him for the order, discipline and progress of the pupils, and for the accuracy and usefulness of the lessons conducted by the teachers-in-training. All members of the teaching staff shall report themselves for duty to the Principal of the Normal School not later than one day before the re-opening of the school after the Easter, Mid-Summer and Christmas vacations.

Ontario Normal College.

74. The Ontario Normal College shall open each year on the 1st of October and close on the 31st of May. Any person who has Senior Leaving standing or who is a graduate in Arts of any university in the British Dominions, and who will be eighteen years of age before the close of the College year may be admitted as a teacher-in-training on application to the Minister of Education on or before the 15th of September.

75. The Course of Study shall consist of lectures on Psychology, the History of Educational systems, the Science of Education, the best methods of teaching each subject on the High School course of study, School Management; instruction in Reading, School Hygiene, Writing, Drawing, Stenography, Physical Culture; practice teaching; and such other subjects as may be prescribed by the Minister of Education. The marks allowed for examination purposes shall be as follows: Psychology and Science of Education, each 200; History of Education, School Management, Methods in English and History, in Mathematics, in Science, in Classics, and in French and German, each 150.

76. Teachers-in-training shall lodge in such houses only as are approved by the Principal; ladies and gentlemen shall not board in the same house nor shall they mingle together in the class-rooms or in the halls of the Normal College. They shall attend regularly and punctually upon lectures and shall submit to the rules of the College with regard to discipline, or any other matter required by the Principal, and shall undertake such practice teaching as may be prescribed by the Minister of Education.

77. The Principal shall be responsible for the organization and management of the College and for the discipline of the teachers-in-training. He shall prescribe the duties of his staff, and shall from time to time be present at their instruction and at the practice teaching of the teachers-in-training. He shall report the sessional examinations to the Education Department on the forms prescribed by the Minister of Education and shall make in addition such observations with respect to the conduct of each teacher in-training and his aptitude as a teacher as he may deem expedient.

78. Each Lecturer shall explain and illustrate the best method of dealing with each branch of his department as it should be taught in the different Forms of a High or Public School, and shall, as far as possible, explain and justify his methods on scientific principles, giving model lessons for classes in different stages of advancement. He shall keep a record of the practice teaching of each teacher-in-training, and shall report to the Principal from

time to time any breach of discipline or any irregularity on the part of the teachers-in-training or any other matter that comes to his notice which may affect the work of the College.

79. Teachers-in-training shall take two written examinations during the Session, viz., one in December and the other in March, and such oral examinations as may be considered necessary for testing their knowledge of methods and their teaching ability. These examinations shall be conducted by the staff of the College; the number of papers at the sessional examinations and the value of the marks in each subject shall be the same as are prescribed for the final written examination. No teacher-in-training shall be recommended to pass by the Examiners who has made less than 34 per cent. of the marks at the sessional examinations (fifty marks being the maximum for each) in Reading, Writing, Drawing or Physical Culture. Any candidate who obtains 34 per cent. of the marks in each subject of the examinations (the sessional and final written examinations being taken jointly), and fifty per cent. of the aggregate marks shall be entitled to pass standing. Candidates making seventy-five per cent. of the aggregate marks shall be awarded honors.

80. At the end of May in each year the teachers-in-training shall submit to an examination conducted by the Education Department. Any candidate who obtains the required standing in Psychology, the Science of Education, the History of Education, School Management, Methods in Mathematics, Methods in English, Methods in Latin, Methods in Elementary Science (the Primary course in Botany and Physics) and Methods in one of the following groups, viz.: (*a*) Greek, or (*b*) French and German, or (*c*) Chemistry, Physics and Biology, shall be entitled to a Normal College Interim certificate. The holder of a Specialist's non-professional certificate in any of the courses recognized by the Education Department, who passes the final examination (including methods in the subjects of his non-professional certificate) shall be entitled to a Normal College Interim Specialist's certificate in the subjects of his non-professional Specialist's course. All students entering the Normal College, irrespective of the academic course which they may have taken, must take the course prescribed, subject to the following conditions:—Holders of Senior Leaving Certificates, granted on Departmental examinations, may omit Latin if they do not select the Greek option; unsuccessful candidates at previous examinations will be allowed to write at the final examination of any year without attendance at the Normal College, and may confine themselves to the same subjects as taken previously; teachers of ten years' successful experience, who hold Normal School Certificates and who have the necessary academic standing, may write at the final examination of the Normal College without attendance; any person graduating with Honors from any University in the British Dominions, who has spent two years as a registered student in postgraduate work in any British, European or other University approved by the Minister of Education, may write at the final examination of the Normal College without attendance, on furnishing satisfactory evidence of having taken such postgraduate course.

The Educational Council.

81. The Educational Council authorized by the Education Department Act, 1901, to conduct Departmental examinations shall hold its first meeting each year as may be fixed by the Minister of Education and shall organize by electing as chairman one of its members. Subsequent meetings of the Council shall be held from time to time as may be determined by the Council.

82. The Council shall appoint examiners of well known ability as teachers either in a University or High School, to prepare examination papers for the (*a*) Part II, Junior Leaving, Senior Leaving and Matriculation examinations, and (*b*) such other examinations as may be transferred to the Council with the approval of the Education Department. The Council shall also appoint examiners of well known experience as Inspectors or teachers, (from lists to be submitted by the Minister of Education) to prepare examination papers at all other departmental examinations.

83. For the purpose of reading the answer papers of candidates at the Examinations of (*a*) aforesaid, the Council shall appoint as associate examiners, graduates of any of the Universities in the British Dominions, or specialists according to the regulations of the Education Department actually engaged in teaching. For the purpose of reading the answer papers of candidates of other examinations the Council shall appoint as associate

examiners, persons holding First Class certificates (in the case of Kindergarten examinations, teachers specially qualified) in actual service. The lists from which such selection is made shall be furnished by the Minister of Education and shall in each case contain the names of at least twice the number of associate examiners to be appointed. The number of examiners appointed by the Council for each examination shall be subject to the instructions of the Minister of Education from time to time.

84. All communications or references requiring the attention of the Council shall be addressed to the Education Department. The Registrar of the Council shall submit for consideration all matters referred by the Minister of Education. The Council shall report promptly to the Minister of Education all matters that require any action by the Education Department or any of its officers. The Council shall appoint an executive committee. The Education Department shall appoint a Chairman of the Board of Examiners who shall exercise such supervision over the examinations as the Council may order. Candidates may have their papers re-examined on placing an appeal to that effect in the hands of the Minister of Education within 20 days after the publication of the result of the examination.

Teachers' Certificates.

85. The Minister of Education may issue certificates on the report of the Educational Council or the Education Department, as follows, viz., District certificates, limited to localities where there is a scarcity of teachers; permanent Third Class Certificates to teachers of ten years' successful experience; any person who attends a Public Kindergarten for one year and passes the prescribed examination shall be entitled to an Assistant's certificate; any person who has obtained an Assistant's certificate and who has attended a Provincial Kindergarten one year and passes the prescribed examinations shall be entitled to a Director's certificate. Any person who attends a Normal School one term and who passes the prescribed examinations shall be entitled to a Second Class Public School certificate. Any person who has passed the final examinations of the Normal College shall be entitled to a Normal College Interim Certificate.

86. A Normal College Interim certificate shall entitle the holder, if under 21 years of age to teach in a Public School only, and if over 21 years, to teach in a Public or High School. After two years' successful experience as teacher, the holder of such certificate shall, on the report of the Inspector concerned, be entitled to a permanent certificate as a First Class Public School teacher or as a High School assistant, ordinary or specialist, according to the class of school in which the experience was acquired. Normal College Interim certificates may be extended from year to year on the report of a Public or High School Inspector. Any graduate in Arts in any University in the British Dominions, who holds a High School Assistant's certificate, and who, as shown by the report of the High School Inspector has taught successfully three years (two of which at least were spent in a High School), shall be entitled to a certificate as Principal of a High School or Collegiate Institute.

87. A third class certificate shall be valid for the full period of three years from the date thereof; and may on expiration be renewed by any Board of Examiners for any period not exceeding three years on the following conditions, viz.:—(*a*) where the applicant has re-passed the Part II Junior Leaving examination or holds a non-professional certificate of a higher grade, (*b*) where the applicant attempted such examination and obtained a standing acceptable to the Board, (*c*) where the applicant has re-passed the County Model School examination. The certificate of any teacher who has not taught the full period of three years for which his certificate was granted may be extended by the County Board for any time lost by sickness or any other cause. In all cases the report of the Inspector with respect to the efficiency of the applicant as a teacher must be satisfactory. All renewals shall be issued with the authority of the Board, and shall be limited to the jurisdiction of the Board of Examiners granting the same.

88. In case it appears that a duly qualified teacher is not available, and that it is in the public interest that a teacher should be temporarily retained in any school, the Minister of Education may on the report of the Inspector extend a third class certificate for one year, such certificate to be valid only under the Board of Trustees applying for the same. With the consent of the Minister of Education, a temporary certificate may be

given by the Inspector to any person of suitable character and attainments where a qualified teacher is not available.

Public School Inspectors and Duties of Inspectors Generally.

89. Any person with five years' successful experience as a teacher of which at least three years shall have been in a Public School; who holds either Specialist's non-professional standing obtained on a University examination, or a Degree in Arts from any University in Ontario with first-class graduation honors in one or more of the other recognized departments in such University; and who has passed the examinations of the Ontario Normal College for a Specialist's certificate shall be entitled to a certificate as an Inspector of Public Schools.

90. Every inspector, of any class of schools conducted under the Education Department, while officially visiting a school, shall have supreme authority in the school, and may direct teachers and pupils in regard to any or all of the exercises of the school-room. He shall, by personal examination or otherwise as he may be directed by the Minister of Education, ascertain the character of the teaching in schools which he is authorized to visit; and shall make enquiry and examination, in such a manner as he may think proper, into the efficiency of the staff, the accommodation and equipment of the school, and all matters affecting the health and comfort of the pupils. He shall report to the Minister of Education any violation of the Schools Act or the Regulations of the Education Department in reference to the class of schools for which he is inspector.

Teachers' Institutes.

91. Every Teachers' Institute shall have one meeting each year on a Friday and Saturday to be named by the Management Committee. The County Council may allow Thursday to be taken also if considered expedient. The Institute shall hold two sittings per day, of three hours each, for at least two days, and one evening sitting. All questions and discussions foreign to the teachers' work shall be avoided. The officers of the Institute shall be a President, Vice-President and Secretary-Treasurer. There shall be a Management Committee of five persons, to be appointed by the members of the Institute. The officers and the Management Committee shall be elected annually.

92. The Inspector shall furnish the Secretary of the Institute with a list of teachers in his County or inspectoral division. Every Public School teacher shall attend continuously all the sessions of the Institute of his County or inspectoral division and shall answer to the calling of the roll at the opening and closing of each session. A report of the sessions attended by each teacher shall be sent by the Secretary to the Board of Trustees employing such teacher.

Teachers' Reading Course.

93. The Minister of Education may prescribe a Course of Reading for the teachers of Public Schools. The Course shall extend over three years and certificates for reading more than three books in one year shall not be granted by the Inspector. For the purposes of the Course the year shall correspond with the calendar year. A teacher may enter on the Course by taking any of the books prescribed for the year. The list of books for each year will be announced by the Education Department.

94. Any teacher who desires a certificate of having taken the Public School Teachers' Reading Course shall make a synopsis of not less than ten or more than fifteen pages of each book read, and shall transmit the same to the Inspector of his district on or before the 30th day of June in each year. Such synopsis shall be accompanied by a fee of twenty-five cents and a declaration that the books prescribed for the year were read and that the synopsis submitted was prepared without assistance by the person signing the same.

95. The Management Committee of each Teachers' Institute shall appoint two persons, who with the Inspector shall form a Committee for determining whether the synopsis made by the teacher desiring a certificate indicates that the books have been read intelligently.

The Inspector shall issue a certificate for each book so read, on the form prescribed by the Minister of Education to every teacher whose synopsis has been found satisfactory. If a teacher is unable to read all the books prescribed for the year or if his synopsis of any book has been rejected, he may substitute the books of the next year for those omitted or rejected.

96. Any teacher who submits to the Education Department certificates showing that he has satisfactorily read nine of the books prescribed, shall be entitled to receive from the Minister of Education a Diploma certifying to the completion of one full reading course covering three years. Additional Diplomas shall be awarded to teachers who complete additional courses of three years.

Religious Instruction.

97. Every Public and High School shall be opened with the Lord's Prayer and closed with the reading of the Scriptures and the Lord's Prayer, or the prayer authorized by the Department of Education. When a teacher claims to have conscientious scruples in regard to opening or closing the school as herein prescribed, he shall notify the Trustees to that effect in writing ; and it shall be the duty of the Trustees to make such provision in the premises as they may deem expedient.

98. The Scriptures shall be read daily and systematically ; the portions used may be taken from the book of selections adopted by the Department for that purpose, or from the Bible, as the Trustees, by resolution, may direct. Trustees may also order the reading of the Bible or the authorized Scripture Selections by both pupils and teachers at the opening and closing of the school, and the repeating of the Ten Commandments at least once a week.

99. No pupil shall be required to take part in any religious exercises objected to by his parents or guardians, and in order to the observance of this regulation, the teacher, before commencing a religious exercise, is to allow a short interval to elapse, during which the children of Roman Catholics, and of others who have signified their objection, may retire. If in virtue of the right to be absent from the religious exercises, any pupil does not enter the school room till the close of the time allowed for religious instruction, such absence shall not be treated as an offence against the rules of the school.

100. The clergy of any denomination, or their authorized representatives, shall have the right to give religious instruction to the pupils of their own church, in each school house, at least once a week, after the hour of closing the school in the afternoon ; and if the clergy of more than one denomination apply to give religious instruction in the same school house, the Board of Trustees shall decide on what day of the week the school house shall be at the disposal of the clergymen of each denomination, at the time above stated. But it shall be lawful for the Board of Trustees to allow a clergyman of any denomination, or his authorized representative. to give religious instruction to the pupils of his own church providing it be not during the regular hours of the school. Emblems of a denominational character shall not be exhibited in a Public School during regular school hours.

Grants to Weak Schools.

101. Where on the report of the Inspector or on other satisfactory evidence it appears that any school section is so limited in area, or is so remote from market or railway accommodation, or has suffered from any exceptional cause as to clearly establish the inability of the ratepayers to bear the ordinary burdens of taxation for school purposes, the Minister of Education may appropriate to such section out of the grant to Poor Schools such sum of money from year to year as he may deem expedient.

102. The Inspector shall submit to the County Council at the regular meeting thereof in January or June of each year, a list of the schools in his Inspectoral Division where the assessment for school purposes is insufficient for the proper maintenance of the school, and shall indicate in each case any special reason why the statutory grants for school purposes should be supplemented by County Council.

103. All schools receiving special grants, either from Township or County Council, shall receive from the Poor School Fund voted by the Legislature the equivalent of such

special grant, provided the sum voted by the Legislature is sufficient. When the Legislative grant is not sufficient to admit of paying the equivalent of the County or Township grant, then such grant shall be made *pro rata*. Any portion of the Poor School Fund remaining after such payments are made may be distributed among other week schools on the report of the Inspector.

Superannuated Teachers.

104. Any subscriber to the fund for superannuated teachers who fails or neglects to pay the annual subscription of $4 on or before the 31st of December in any year, shall be required to pay for such year the sum of $5. In the case of persons under sixty years of age who have been placed upon the superannuated list, proof of disability for professional service shall be furnished annually to the Department. Should it appear that any superannuated teacher under sixty years of age is capable of resuming his profession, the allowance shall in the meantime be withdrawn. No allowance shall be paid unless satisfactory evidence of good moral character is furnished the Education Department annually, or when required.

Text Books.

105 The copyright of every authorized text book shall, where possible, be vested in the Education Department. The publisher of an authorized text book shall submit to the Minister of Education a sample copy of every edition for approval, and no edition of any text book shall be considered as approved unless a certificate to that effect,in writing, has been issued by the Minister of Education.

106. Before any authorized text book is placed on the market, the publisher thereof shall execute such agreements and give such security for the publication of such book as may be required by the Minister of Education. Any authorized text book shall be subject at every stage of its manufacture to the inspection and approval of the Education Department as regards printing, binding and paper, and may be removed from the list of authorized text books in case the publisher fails to comply with the regulations of the Education Department.

107. Every authorized text book shall bear the imprint of the publisher, and shall show upon the cover the authorized retail price. No part of an authorized text book shall be used for advertising purposes, and no change shall be made in the letter press, binding or paper of any authorized text book without the consent of the Minister of Education. Books recommended as reference books shall not be used as text books by the pupils and any teacher who permits such books, or any other book not authorized as a text book for the Public Schools, to be used as such, shall be liable to such penalties as are imposed by the Schools Act.

General Directions to Trustees.

108. The notice calling an annual or special meeting should be signed by the Secretary or by a majority of the trustees. Any ratepayer may call the meeting to order and nominate a chairman as soon as the hour appointed arrives. The business of all school meetings should be conducted according to the following rules of order :—

(1) *Addressing Chairman*,—Every elector shall rise previously to speaking, and address himself to the chairman.

(2) *Order of speaking*.—When two or more electors arise at once, the chairman shall name the elector who shall speak first, when the other elector or electors shall next have the right to address the meeting in the order named by the chairman.

(3) *Motion to be read*—Any elector may require the question or motion under discussion to be read for his information at any time, but not so as to interrupt an elector who may be speaking.

(4) *Speaking twice*.—No elector shall speak more than twice on the same question or amendment without leave of the meeting, except in explanation of something which may have been misunderstood, or until everyone choosing to speak shall have spoken.

(5) *Protest.*—No protest against an election, or other proceedings of the school meeting, shall be received by the chairman. All protests must be sent to the Inspector within twenty days at least after the meeting.

(6) *Adjournment.*—A motion to adjourn a school meeting shall always be in order, provided that no second motion to the same effect shall be made until after some intermediate proceedings shall have been had.

(7) *Motion to be in writing and seconded.*—A motion cannot be put from the chair, or debated, unless the same be seconded. If required by the chairman, all motions must be reduced to writing.

(8) *Withdrawal of a motion.*—After a motion has been announced or read by the chairman, it shall be deemed to be in possession of the meeting; but may be withdrawn at any time before decision, by the consent of the meeting.

(9) *Kind of motions to be received.*—When a motion is under debate no other motion shall be received, unless to amend it, or to postpone it, or for adjournment.

(10) *Order of putting motion.*—All questions shall be put in the reverse order in which they are moved. Amendments shall be put before the main motion; the last amendment first, and so on.

(11) *Reconsidering motion.*—A motion to reconsider a vote may be made by any elector at the same meeting; but no vote of reconsideration shall be taken more than once on the same question at the same meeting.

(12) *Minutes.*—At the close of every annual or special meeting the chairman should sign the minutes, and send forthwith to the Inspector a copy of the same signed by himself and the Secretary.

(13) *Legal Trustee.*—Every Trustee declared elected by the Chairman of the school meeting is a legal Trustee until his election is set a ide by proper authority.

(14) *Use of Seat.*—The seal of the school corporation should not be affixed to letters or notices, but only to contracts, agreements deeds, or other papers, which are designed to bind the Trustees as a corporation for the payment of money, or the performance of any special act, duty or thing.

Instructions and Regulations.

109 Instructions may be issued by the Minister of Education from time to time to Inspectors or other officers in carrying out the provisions of these Regulations.

110 All former Regulations of the Education Department are hereby repealed.

Schedule A.—Public School Courses of Study.

Optional subjects are indicated with a *.

Form I.

Reading.—The use of the Tablets and Parts I and II. of the First Reader.

Spelling.—Spelling from dictation and orally.

Writing.—Writing from blackboard copies.

Geography.—Conversations respecting the earth; its divisions of land and water; its plants and animals: explanation of any reference to places in the reading lessons.

English Language.—Oral exercise in language, correction of mistakes in conversation.

Arithmetic.—Notation and numeration to 1,000; addition and subtraction; mental arithmetic.

Drawing.—The exercises in First Reader and blackboard exercises.

Music.—Note singing.

Form II.

Reading.—The Second Reader; easy quotations on the literature of every lesson.

Spelling.—Oral spelling and dictation on slates and paper; blackboard exercises.

Writing.—Copy Books Nos. 1 and 2.

Geography.—Local geography and elementary definitions; map of the world; map geography of all places referred to in reading lessons.

English Language.—Oral and written exercises in language and composition; correction of mistakes in conversation.

Arithmetic.—Notation and numeration to 1,000,000; multiplication and division; mental arithmetic.

Physiology and Temperance.—Conversations on temperance, the use of alcoholic stimulants, and the laws of health.

Drawing.—Authorized Drawing Course, Nos. 1 and 2.

Music.—Rote singing, continued; easy notation.

Form III.

Reading.—The Third Reader; literature of every lesson.

Spelling.—Course in Form II. continued.

Writing.—Copy books Nos 3 and 4.

Geography.—Definitions; general geography of the Dominion of Canada; North and South America; Ontario more particularly; map drawing.

Grammar and Composttion.—Classes of words and their inflections; simple analysis; descriptive and letter writing.

History.—Conversations on British and Canadian History; local history.

Arithmetic.—Reduction; compound rules; bills and accounts; averages and aggregates; sharing and measurements; mental arithmetic.

Physiology and Temperance.—Conversations on temperance; the physical effects of intoxicating liquors; importance of exercise.

Drawing.—Authorized Drawing Course, Nos. 3 and 4.

Music.—Easy exercises in musical notation; songs.

Form IV.

Reading.—The Fourth Reader; the literature of every lesson.

Spelling.—Systematic orthography and orthoëpy.

Writiug.—Copy Books Nos. 4 and 5.

Geography.—Geography of Canada and the British Empire; the continents; map drawing

Grammar and Composition.—Elements of formal grammar, analysis and composition. Descriptive, narrative and letter writing.

History.—Leading events in Canadian and British History, with special attention to Canadian History since 1841.

Arithmetic.—Measures, multiples, fractions, percentage, interest, mental arithmetic.

Physiology and Temperance.—Digestion, respiration, the circulation of the blood and the nervous system. The effects of alcohol and narcotics.

Drawing.—Authorized Drawing Course Nos. 5 and 6.

Music.—Course in Form IV. continued.

Agriculture (for rural schools).—Conversations.

Form V.

Reading.—Practice in oral reading continued.

English Grammar and Rhetoric.—Etymology and Syntax, including the inflection, classification and elementary analysis of words and the logical structure of the sentence; rhetorical structure of the sentence and paragraph; exercises chiefly on passages from authors not prescribed.

English Composition.—Essays on familiar subjects; familiar letters.

English Poetical Literature.—Intelligent and appreciative comprehension of the selections read; memorization of the finest passages; supplementary reading from authors prescribed by the teacher; oral reading of the texts. In Poetical Literature the course for Form V. will embrace such selections from the High School Reader as are recom-

mended by the teacher. No special selections are prescribed by the Department. Where the trustees have provided books for Supplementary Reading, such works as are recommended by the teacher, under the direction of the Inspector, may also be read.

History.—The History of Canada; British History.

Geography.—The building up of the earth; its land surface; the ocean; comparison of continents as to physical features, natural products and inhabitants; relations of physical conditions to animal and vegetable products, and of natural products and geographical condition to the occupations of the people and national progress. Form, size and motions of the earth; lines drawn on the map, with reasons for their position; relation of the positions of the earth with respect to the sun, to light and temperature; the air, its movements; causes effecting climate. Natural and manufactured products of the countries of the world, with their exports and imports; trans-continental commercial highways and their relation to centres of population; internal commercial highways of Canada and the chief internal commercial highways of the United States; commercial relations of Great Britain and her colonies. Forms of governments in the countries of the world and their relation to civilization.

Arithmetic and Mensuration.—Proofs of elementary rules in arithmetic; fractions (theory and proofs); commercial arithmetic; mental arithmetic; mensuration of rectilinear figures.

Algebra.—Elementary rules; highest common measure; lowest common multiple; fractions begun.

Geometry.—Euclid, Book I., propositions 1-26; easy deductions.

Drawing.—Object and model drawing; High School Drawing Course, Books Nos. 1 and 2.

Bookkeeping.—Bookkeeping by single and double entry; commercial forms, such as drafts, notes and cheques; general business transactions. The bookkeeping shall be specially suitable for farmers and artisans or for retail merchants and general traders.

**Botany.*—The practical study of representatives of the following natural orders of flowering plants: Ranunculaceæ, Cruciferæ, Malvaceæ, Leguminosæ, Rosaceæ, Sapindaceæ Umbelliferæ, Compositæ, Labiatæ, Cupuliferæ, Araceæ, Liliaceæ, Iridaceæ, Coniferæ, and Gramineæ (types contained in text-book.) Drawing and description of plants and their classification. Comparison of different organs, morphology of root, stem, leaves and hairs, parts of the flowers, germination, reproduction of flowering plants, pollination, fertilization and the nature of fruits and seeds.

Agriculture (for rural schools).—The course in the authorized text book to page 73.

**Latin and Greek.*—The Elementary Latin Book, Grammar, Composition and sight reading. The Beginner's Greek Book begun.

**French and German.*—Grammar, Composition and sight reading.

**Domestic Economy.*

**Manual Training.*

Note.—It should be remembered that Algebra and Geometry are obligatory subjects of Form V. The time to be devoted to these subjects as well as to Geography, Arithmetic and Mensuration, English Grammar, English Composition, History of Great Britain and Canada, is left to the discretion of the teacher, who should be guided by the Inspector (Regulation 17). Regarding Reading, English Literature, Drawing, Bookkeeping, Botany or Agriculture, the minimum amount of time, as specified herein for Part I Junior Leaving Standing, must be given. Throughout the course and especially in the lower Forms much attention should be given to elementary science or "Nature Study." The subject may be taken in connection with Geography.

Schedule B.—High School Courses of Study

Form I.

Reading—Practice in Oral Reading.

English Grammar and Rhetoric.—Etymology and Syntax, including the inflection, classification and elementary analysis of words and the logical structure of the sentence; rhetorical structure of the sentence and paragraph; exercises chiefly on passages from authors not prescribed.

English Composition.—Essays on familiar subjects; familiar letters.

English Political Literature.—Intelligent and appreciative comprehension of the selections read; memorization of the finest passages; Supplementary Reading from

authors provided in the High School library or supplied by pupils under the authority of the High School Board ; oral reading of the texts. In Poetical Literature for Forms I and II, no special texts are prescribed by the Department, but the pupils shall study such selections from the High School Reader as may be recommended by the Principal, together with such books for Supplementary Reading as he may recommend, and which may be obtained from the Library of the School.

History —The History of Canada ; British History.

Geography.—The building up of the earth ; its land surface ; the ocean ; comparison of continents as to physical features, natural products and inhabitants ; relations of physical conditions to animal and vegetable products, and of natural products and geographical condition to the occupations of the people and national progress. Form, size and motions of the earth ; lines drawn on the map with reasons for their position ; relations of the positions of the earth with respect to the sun, to light and temperature ; the air, its movement ; causes affecting climate. Natural and manufactured products of the countries of the world, with their exports and imports ; transcontinental commercial highways and their relations to centres of population ; internal commercial highways of Canada and the chief internal commercial highways of the United States ; commercial relations of Great Britain and her colonies. Forms of governments in the countries of the world and their relation to civilization.

Arithmetic and Mensuration.—Proofs of elementary rules in Arithmetic ; Fractions (theory and proofs) Commercial Arithmetic ; Mental Arithmetic ; Mensuration of rectilinear figures.

Algebra.—Elementary rules ; Highest Common Measure ; Lowest Common Multiple ; Fractions begun.

Geometry.—Euclid, Book I., propositions 1-26 ; easy deductions.

Drawing—Object and Model Drawing, High School Drawing Course Books 1 and 2 ; *Perspective Drawing, Book 3.

Bookkeeping—Book-keeping by single and double entry ; commercial forms, such as drafts, notes and cheques ; general business transactions. The bookkeeping shall be specially suitable for farmers and artisans or for retail merchants and general traders.

**Agriculture.*

**Domestic Science.*

**Manual Training.*

**Stenography.*—The elements of Pitman's system.

**Latin and Greek,*—The Elementary Latin Book, grammar, composition and sight-reading. The Beginners' Greek Book begun.

**French and German* —Grammar, composition, conversation, dictation and sight-reading.

**Botany.*—The practical study of representatives of the following natural orders of flowering plants : Ranunculaceæ, Cruciferæ, Malvaceæ, Leguminosæ, Rosaceæ, Sapindaceæ, Umbelliferæ, Compositæ, Labiatæ, Cupuliferæ, Araceæ, Liliaceæ, Iridaceæ, Coniferæ and Gramineæ (types contained in text book). Drawing and description of plants and their classification. Comparison of different organs, morphology of root, stem, leaves and hairs, parts of the flowers, germination, reproduction of flowering plants, pollination, fertilization and the nature of fruits and seeds.

Form II.

Reading—The course in Form I continued.

English Grammar and Rhetoric.—The course in Form I continued, with the main facts in the development of the language.

English Composition.—The course in Form I continued.

English Poetical Literature.—The course in Form I. continued.

History—Great Britain and Canada from 1763 to 1871, with the outlines of the preceding periods of British History. The Geography relating to the History prescribed.

Arithmetic and Mensuration.—Course in Arithmetic in Form I. reviewed and completed. Mensuration ; right parallelopipeds, pyramids and prisms ; the circle sphere, cylinder and cone.

Algebra.—The course in Form I. reviewed and completed, with simple equations of one, two and three unknown quantities; simple problems.

Geometry.—Euclid; Book I.; deductions.

**Latin and Greek.*—The course in Latin in Form I. continued. The Beginner's Greek Book, to page 301; sight translation.

**French and German.*—The course in Form I. continued.

**Physics.*—An experimental course defined as follows:—Metric system of weights and measures. Use of the balance. Phenomena of gravitation. Matter attracts matter. Laws of attraction. Cavendish experiment. Attraction independent of condition. Illustration of weight of gases, liquids and solids. Specific gravity. Meaning of the term "a form of matter." All matter may be subjected to transmutation. "Chemistry," application of measurement by weight (mass) to such transmutation leads to the theory of elements. Matter indestructible. Meaning of "Force." Various manifestations of force, with illustrations from the phenomena of electricity, magnetism and heat. Force measured in gravitation units; consequent double meaning of the terms expressing units of weight as mass and units of weight as force. Meaning of "Work." Measurement of work in gravitation units. Meaning of "Energy." Effect of force continuously applied to matter. Laws of matter in motion. Velocity; Acceleration. Statement of Newton's laws of motion. Definition of "Mass" Meaning, value and application of "g." Mass a measure of matter. Conservation of energy. Energy, like matter, indestructible, and transmutable. Study of the states of matter. Properties and laws of gases, liquids and solids. Laws of diffusion. Elementary laws of heat. Mechanical equivalent. Latent heat Specific heat. Calorie.

**Bookkeeping.*—Bookkeeping by single and Double entry; business forms, usages and correspondence. The Principal and the Board of Trustees may arrange any other course in Bookkeeping that in their opinion is better adapted to the interests of the pupils taking up the subject.

**Stenography.*—Course in Form I. continued.

Form III.

English Composition.—Essay-writing.

English Poetical Literature.—Course in Form II. continued, with the prescribed texts.

History.—Outlines of Roman History to the death of Augustus, and of Greek History to the Battle of Chaeronea. The geography relating to the history prescribed.

Algebra.—Course in Form II. reviewed; Square Root; Indices; Surds; Quadratics of one or two unknown quantities.

Geometry.—Euclid; Books I., II. and III. Deductions.

Latin and Greek.—Course in Form II. continued; with the prescribed texts.

French and German.—Course in Form II. continued; with the prescribed texts.

Chemistry.—An experimental course defined as follows:—Properties of Hydrogen, Chlorine, Oxygen, Sulphur, Nitrogen, Carbon and their more important compounds. Nomenclature. Laws of combination of the elements. The Atomic Theory and Molecular Theory.

Physics.—Electricity.—Voltaic cells, common kinds; chemical action in the cell; magnetic effects of the current; chemical effects of the current; voltameter; astatic and tangent galvanometers; simple notions of potential; Ohm's law, with units; best arrangement of cells; electric light, arc and incandescent; magnetism; inclination and declination of compass; current induction; induction coil; dynamo and motor; electric bell; telegraph; telephone; electro-plating. Sound.—Caused by vibrations; illustration of vibrations, pendulums, rods, strings, membranes, plates, columns of air; propagated by waves; its velocity, determination of velocity; pitch; standard forks, acoustical C = 512, musical, A = 870; intervals; harmonic scale; diatonic scale; equally tempered scale; vibration of air in open and closed tubes, with wave-lengths; resonators; nodes and loops; vibration of strings and wires; reflection of sound; manometric flames. Light.—Rectilinear propagation; image through a pin hole; beam; pencil; photometry; shadow and grease-spot photometers; reflection and scattering of light; laws of reflection; images in plain mirrors; multiple images in inclined mirrors; concave and convex mirrors; drawing images; refraction; laws and index of refraction; total reflexion; path through a prism;

lenses; drawing image produced by a lense; simple microscope; dispersion and color; spectrum; recomposition of white light.

Botany.—The practical study of representatives of the flowering plants of the locality and representatives of the chief sub-divisions of cryptogams, such as a fern, a lycopod, a horse-tail, a liverwort, a moss, a lichen, a mushroom and a chara. The drawing and description of parts of plants and classification. Comparison of different organs, morphology of root, stem, leaves and hair, parts of the flower, reproduction of flowering plants, pollination, fertilization and the nature of fruit and seeds.

Form IV.

English Composition.—Course in Form III. continued.

English Poetical Literature—Course in Form III. continued, with the prescribed texts.

History.—English History from the discovery of America to 1763. Ancient History, the course in Form III. reviewed. The geography relating to the history prescribed.

Algebra.—Course in Form III. reviewed, Theory of Divisors; Ratio, Proportion and Variation; Progressions; Notation; Permutations and Combinations; Binominal Theorem; Interest Forms; Annuities.

Geometry.—Euclid. The course in Forms II. and III. reviewed; Books IV. and VI.; Definitions of Book V.; Deductions.

Trigonometry.—Trigonometrical ratios, with their relations to each other; Sines, etc., of the sum and difference of angles with deduced formulas; Use of Logarithms; Solution of Triangles; expressions for the area of triangles; Radii of circumscribed, inscribed and escribed circles.

Latin and Greek.—Course in Form III. continued, with the prescribed texts.

French and German—Course in Form III. continued, with the prescribed texts.

Physics.—An experimental course defined as follows:—Mechanics—Uniformly accelerated rectilineal motion, particularly under gravity; composition and resolution of forces; triangle and parallelogram of forces; friction; polygon of forces; with easy examples. Hydrostatics—Fluid pressure at a point; pressure on a horizontal plane; pressure on an inclined plane; resultant vertical pressure, and resultant horizontal pressure, when fluid is under air pressure and when not; transmission of pressure; Bramah's press; equilibrium of liquids of unequal density in a bent tube; the barometer; air pump; water pump, common and force; siphon. Electricity—Voltaic cells, common kinds; chemical action in the cell; magnetic effects of the current; chemical effects of the current voltameter; astatic and tangent galvanometers; simple notions of potential; Ohm's law, with units, best arrangement of cells; electric light, arc and incandescent; magnetism; inclination and declination of compass; current induction; induction coil; dynamo and motor; electric bell; telegraph; telephone; electro-plating. Sound.—Caused by vibrations; illustration of vibrations, pendulums, rods, strings, membranes, plates, columns of air; propagated by waves; its velocity; determination of velocity; pitch; standard forks, accoustical C = 512, musical A = 870; intervals; harmonic scale; diatonic scale; equally tempered scale; vibration of air in open and closed tubes, with wave lengths; resonators; nodes and loops; vibration of strings and wires; reflection of sound; manometric flames. Light.—Rectilinear propagation; image through a pin-hole; beam; pencil; photometry; shadow and grease-spot photometers; reflection and scattering of light; laws of reflection; images in plain mirrors; multiple images in inclined mirrors; concave and convex mirrors; drawing images; refraction; laws and index of refraction; total reflection; path through a prism; lenses; drawing image produced by a lense; simple microscope; dispersion and color; spectrum; recomposition of white light.

Chemistry. Chemical theory. The practical study of the following elements, with their most characteristic compounds, in illustration of Mendelejeffs classification of the elements. Hydrogen; Sodium; Potassium; Magnesium, Zinc; Calcium; Strontium; Barium; Boron, Aluminum; Carbon, Silicon, Tin, Lead; Nitrogen; Phosphorus; Arsenic; Antimony; Bismuth; Oxygen, Sulphur; Fluorine, Chlorine, Bromine, Iodine: Manganese, Iron. Elementary Qualitative Analysis.

Biology.—Elements of Zoology.—Thorough examination of the external form, the gills and the viscera of some common fish. Study of the prepared skeleton of the same. Demonstration of the arrangement of the muscular and nervous systems and the sense organs, as far as these can be studied without the aid of a microscope. Comparison of the structure of the frog with that of the fish The skeleton of the pectoral and pelvic girdles, and of the appendages of the frog, and the observation of the chief facts in the development of its spawn, till the adult form is attained. Examination of the external form of a turtle and a snake. Examination of the structure of a pigeon or a fowl. Study of the skeleton and also of the teeth and viscera of a cat or dog. Study of the crayfish as a type of the Arthropods. Comparison of the crayfish with an insect (grasshopper, cricket or cockroach), also with a millipede and a spider. Examination of an earthworm and a leech. Study of a fresh-water mussel and a pond snail. The principles of zoological nomenclature as illustrated by some of the common fresh-water fish, such as the sucker and herring, bass and perch. Study of an amœba or paramœcium as a type of a unicellular animal. The modifications of the form of the body in vertebrates in connection with different methods of locomotion. Elements of Botany.—The practical study of representatives of the flowering plants of the locality in which the school is situated, and representatives of the chief sub-divisions of cryptogams, such as a fern, a lycopod, a horsetail, a liver wort, a moss, a lichen, a mushroom and a chara. An elementary knowledge of the microscopic structure of the Bean and the Maize. The drawing and description of parts of plants and classification Comparison of different organs, morphology of root, stem, leaves and hair, parts of the flower, reproduction of flowering plants, pollination, fertilization and the nature of fruit and seeds.

Schedule C.—Examination Requirements.

Part I, Junior Leaving Standing.

Geography.

The building up of the earth ; its land surface ; the ocean ; comparison of continents as to physical features, natural products and inhabitants ; relation of physical conditions to animal and vegetable products, and of natural products and geographical condition to the occupations of the people and national progress. Form, size and motions of the earth ; lines drawn on the map, with reasons for their position ; relation of the positions of the earth with respect to the sun, light and temperature ; the air ; its movements ; causes affecting climate. Natural and manufactured products of the countries of the world, with their exports and imports ; transcontinental commercial highways and their relation to centres of population ; internal commercial highways of Canada and the chief internal commercial highways of the United States ; commercial relations of Great Britain and her colonies Forms of government in the countries of the world and their relation to civilization. One examination paper.

Arithmetic and Mensuration.

Proofs of elementary rules in Arithmetic ; fractions (theory and proofs) ; commercial Arithmetic ; mental Arithmetic ; Mensuration of rectilinear figures One examination paper. (The questions will call for accuracy and will have special reference to the requirements of ordinary life.

English Grammar.

Etymology and Syntax, including the inflection, classification and elementary analysis of words and the logical structure of the sentence and paragraph ; exercises chiefly on passages from authors not prescribed. One examination paper. (The questions will call for such an elementary knowledge of the subject as will be of special value in the ordinary use of the language.

English Composition.

For examination purposes an essay of about two pages of foolscap on one of the themes prescribed by the examiners will be required. The penmanship, spelling, punctuation, construction of sentences, the logical arrangement of the thought, the literary accuracy and aptness of the language and the general plan or scope of the whole essay will be especially considered by the examiners. One examination paper.

History of Great Britain and Canada.

Great Britain and Canada from 1763 to 1885, with the outlines of the preceding periods of British History.

The Geography relating to the History prescribed. One examination paper.

(*Part II, Junior Leaving Standing.*)

English.

English Grammar and Rhetoric : Etymology and Syntax, including the inflection, classification and elementary analysis of words, and the logical structure of the sentence ; rhetorical structure of the sentence and paragraph ; exercises chiefly on passages from authors not prescribed ; the main facts in the development of the language. One examination paper.

Composition : Any essay, to which special importance will be attached, on one of several themes set by the examiners. In order to pass in this subject, legible writing, correct spelling and punctuation, and proper construction of sentences are indispensable. The candidate should also give attention to the structure of the whole essay, the effective ordering of the thought, and the accurate employment of a good English vocabulary.

About two pages of foolscap is suggested as the proper length for the essay ; but quality, not quantity, will be mainly regarded. One examination paper.

Literature : Such questions only shall be set as may serve to test the candidate's familiarity with, and intelligent and appreciative comprehension of the prescribed texts. The candidate will be expected to have memorized some of the finest passages. In addition to the questions on the prescribed selections, others shall be set on a "sight passage" to test the candidate's ability to interpret literature for himself. One examination paper.

Ancient History.

(1) General outlines of Greek History to the Battle of Chæronea, 338 B. C.
(2) General outlines of Roman History to the Death of Augustus.
The Geography relating to the History prescribed.
One examination paper.

Mathematics.

Arithmetic and Mensuration : Proofs of elementary rules in Arithmetic : fractions (theory and proofs) ; commercial Arithmetic ; mental Arithmetic : Mensuration of right parallelopipeds, pyramids and prisms ; the circle, sphere, cylinder and cone. One examination paper.

Algebra : Elementary Rules ; Highest Common Measure ; Lowest Common Multiple ; Fractions ; Square Root ; Simple Equations of one, two, and three unknown quantities ; Indices ; Surds ; Quadratics of one and two unknown quanties.

One examination paper.

Geometry : Euclid, Books I., II., and III., easy deductions.

One examination paper.

Physics.

(*a*) Use of metre rule ; use of calipers and vernier for more accurate metric measurements (*e. g.*, diameters of wires, thickness of glass, plates, etc.) ; numerical calculations in the metric system.

Use of balance.

Specific gravity, by specific gravity bottle and hydrostatic balance, of liquids and of solids.

Boyle's law ; barometer ; diffusion of gasses.

Use of Fahrenheit and Centigrade theremometers ; determination of zero and boiling point ; boiling point dependent on pressure.

Expansion of solids, liquids and gases ; examples.

Specific heat ; latent heat ; easy numerical examples.

Transmutation of matter ; indestuctibility of matter.

Solution, precipitation, crystallization and evaporation.

(*b*) ELECTRICITY.—Voltaic cells, common kinds ; chemical action in the cell ; magnetic effects of the current ; chemical effects of the current ; voltameter ; astatic and tangent galvanometers ; simple notions of potential ; Ohm's law, with units ; best arrangement of cells ; electric light, arc and incandecent ; magnetism ; inclination and declination of compass : current induction ; induction coil ; dynamo and motor ; electric bell ; telegraph ; telephone ; electro-plating SOUND.—Caused by vibrations ; illustration of vibrations, pendulums, rods, strings, membranes, plates, columns of air ; propagated by waves ; its velocity ; determination of velocity ; pitch ; standard forks, acoustical C=512, musical A=870 ; intervals ; harmonic scale ; diatonic scale ; equally tempered scale ; vibration of air in open and closed tubes with wave lengths ; resonators ; nodes and loops ; vibration of strings and wires ; reflection of sound ; manometric flames. LIGHT —Rectilinear propagation ; image through a pin hole ; beam ; pencil ; photometry ; shadow and grease spot photometers ; reflection and scattering of light ; laws of reflection ; images in plain mirrors ; multiple images in inclined mirrors ; concave and convex mirrors ; drawing images ; refraction ; laws and index of refraction ; total reflection ; path through a prism ; lenses ; drawing image produced by a lens ; simple microscopic ; dispersion and color ; spectrum recomposition of white light.

One examination paper.

There will be no separate written examination in (*a*), but the examination paper in Physics, while mainly confined to the course in that subject as outlined for (*b*), will also assume that the candidate possesses a competent knowledge of (*a*).

Latin

Translation into Latin of English phrases and easy sentences to illustrate Latin accidence and the common rules of Latin syntax.

Translation into Latin of easy narrative English based upon the first twenty-five chapters of the prescribed Cæsar.

Translation at sight (with the aid of vocabularies) from some easy prose author.

Translation from prescribed texts, with grammatical and other questions naturally arising from the extracts set for translation.

Two papers will be set: (1) Translation of English into Latin. (2) Prescribed texts and translation at sight, with questions on Grammar, etc.

N.B.—The Roman method of pronouncing Latin is recommended.

French.

The candidate's knowledge of French will be tested by : (1) simple questions on grammar, (2) the translation of simple passages from English into French, (3) translation at sight of easy passages from modern French and (4) an examination on the texts prescribed.

Two passages will be set : (1) prescribed texts and translation at sight ; questions on Grammar ; (2) the translation of English into French.

Greek.

Translation into English of passages from prescribed texts.

Translation at sight (with the aid of vocabularies) of easy Attic prose to which special importance will be attached.

Grammatical questions on the passages from prescribed texts will be set, and such other questions as arise naturally from the context.

Translation from English into Greek of sentences and of easy narrative passages based upon the prescribed prose texts.

Two papers will be set : (1) prescribed texts and translation at sight ; questions on Grammar ; (2) the translation of English into Greek.

German.

The candidate's knowledge of German will be tested by : (1) simple questions on grammar, (2) the translation of simple passages from English into German, (3) translation at sight of easy passages from modern German, and (4) an examination on the texts prescribed.

Two papers will be set : (1) prescribed texts and translation at sight ; questions on Grammar ; (2) the translation of English into German.

Chemistry.

Properties of Hydrogen, Chlorine, Oxygen, Sulphur, Nitrogen, Carbon, and their more important compounds. Nomenclature. Laws of combination of the elements The Atomic Theory and Molecular Theory.

One examination paper.

(Part I, Senior Leaving Standing).

English.

Composition : An essay, to which special importance will be attached, on one of several themes set by the examiner.

One examination paper.

Literature : The candidate will be expected to have memorized some of the finest passages. Besides questions to test the candidates familiarity with, and comprehension

of the prescribed selections, questions may also be set to determine within reasonable limits his power of appreciating literary art.

RHETORIC: Reading of prose authors in connection with the study of rhetoric.

One examination paper.

Mathematics.

ALGEBRA: Elementary Rules; Highest Common Measure; Lowest Common Multiple; Fractions; Square Root; Simple Equations of one, two and three unknown quantities; Indices; Surds; Quadratics of one and two unknown quantities; Theory of Divisors; Ratio, Proportion, and Variation; Progressions; Notation; Permutations and Combinations; Binomial Theorem; Interest Forms; Annuities.

One examination paper.

GEOMETRY: Euclid, Books I, II, III, IV, and VI; Definitions of Book V; Deductions.

One examination paper.

TRIGONOMETRY: Trigonometrical ratios with their relations to each other; Sines, etc., of the sun and difference angles with deduced formulas; Use of Logarithms; Solution of Triangles; Expressions for the area of Triangles; Radii of circumscribed, inscribed, and escribed circles.

One examination paper.

History.

English History from the discovery of America to 1763.

General outlines of Greek History to the battle of Chæronea, 338 B.C. Special attention to be paid to the following: General characteristics of Greece and the Greeks; ancient institutions; constitution of Athens and Sparta; Persian wars; growth of the Athenian Empire; characteristics of the age of Pericles; Peloponnesian wars; rise of Thebes; Theban supremacy; rise of Macedon; downfall of Greece.

General outlines of Roman History to the death of Augustus. Special attention to be given to the following: General characteristics of Italy and the Roman people; struggle of the Plebians for political and social equality; conquest of Italy; Punic wars; how Rome governed and was governed; internal and external History of Rome from the downfall of Carthage to the death of Augustus.

The Geography relating to the History prescribed.

One examination paper.

(*Part II, Senior Leaving Standing*).

Physics.

MECHANICS: Measurement of velocity; uniformly accelerated rectilineal motion; metric units of force, work, energy, and power; equilibrium of forces acting at a point; triangle, parallelogram, and polygon of forces; parallel forces; principal moments; centre of gravity; laws of friction; numerical examples.

HYDROSTATICS: Fluid pressure at a point; pressure on a horizontal plane; pressure on an inclined plane; resultant vertical pressure, and resultant horizontal pressure, when fluid is under air pressure and when not; transmission of pressure; Bramah's press; equilibrium of liquids of unequal density in a bent tube; the barometer; air-pump, water-pump, common and force; siphon.

ELECTRICITY: Voltaic cells, common kinds; chemical action in the cell; magnetic effects of the current; chemical effects of the current; voltameters electroplating; astatic and tangent galvanometers; simple notions of potential; Ohm's law; shunts; measurement of resistance; electric light, arc and incandescent; current induction; induction

coil; dynamo and motor; the joule and watt; electric bell; telegraph; telephone; elements of terrestrial magnetism.

One examination paper.

Latin.

Translation into English of passages from prescribed texts.

Translation at sight of passages of average difficulty, similar in style to the authors read.

Grammatical questions on the passages from prescribed texts will be set, and such other questions as arise naturaly from the context.

Translation into Latin of easy passages of English, similar in style to the authors read.

Two examination papers.

French.

The prescription of work in grammar, the translation of English into French and sight translation is the same for Senior Leaving Standing as for Junior Leaving Standing, but the examination will be of a more advanced character.

Two examination papers.

Greek.

Translation into English of passages from prescribed texts.

Translation at sight of passages of average difficulty, similar to the authors read.

Grammatical questions on the passages from prescribed texts will be set, and such other questions as arise naturally from the context.

Translation into Greek of ordinary narrative passages of English, similar to the authors read.

Two examination papers.

German.

The prescription of work in grammar, the translation of English into German and sight translation is the same for Senior Leaving Standing as for Junior Leaving Standing, but the examination will be of a more advanced character.

Two examination papers.

Chemistry.

Chemical Theory. The study of the following elements, with their most characteristic compounds, in illustration of Mendelejeff's Classification of the Elements: Hydrogen; Sodium, Potassium; Magnesium, Zinc; Calcium, Strontium, Barium; Boron, Aluminium; Carbon, Silicon, Tin, Lead; Nitrogen, Phosphorus, Arsenic, Antimony, Bismuth; Oxygen, Sulphur; Fluorine, Chlorine, Bromine, Iodine; Manganese, Iron. Elementary Qualitative Analysis.

A practical examination shall be held in connection with this subject, a pure salt will be sent out for qualitative analysis, and the candidate shall be allowed the use of an analytical table.

One examination paper.

Biology

1. *Elements of Zoology*: Thorough examination of the external form, the gills, and the viscera of some common fish. Study of the prepared skeleton of the same. Demonstration of the arrangement of the muscular and nervous systems and the sense-organs, as far as these can be studied without the aid of the microscope.

Comparison of the structure of the frog with that of the fish. The skeleton of the pectoral and pelvic girdles and of the appendages of the frog, should be studied, and the chief facts in the development of its spawn till the adult form is attained should be observed.

Examination of the external form of a turtle and a snake.

Examination of the structure of a bird.

Study of the skeleton, and also of the teeth of a cat or dog.

Study of the crayfish as a type of the Arthropods.

Comparison of the crayfish with an insect (grasshopper, cricket, or cockroach); also with the millipede and a spider.

Examination of an earthworm.

Study of a fresh-water mussel.

The principles of zoological nomenclature as illustrated by some of the common fresh water fish, such as the sucker and herring, bass and perch.

Study of an amœba, or paramœcium as a type of a unicellular animal.

The modifications of the form of the body in vertebrates in connection with different methods of locomotion. The natural habits of the various animals examined.

2. *Elements of Botany*: The examination will test whether the candidate has practically studied representatives of the flowering plants of the locality in which the preparatory school is situated, and representatives of the chief subdivisions of cryptogams, such as a fern, a lycopod, a horsetail, a liverwort, a moss, a lichen, a mushroom, and a chara.

An elementary knowledge of the microscopic structure of the bean and the maize. Attention will be given in the examination to drawing and description of parts of plants supplied, and to their classification. Comparison of different organs, morphology of root, stem, leaves and hair, parts of the flower, reproduction of flowering plants, pollination, fertilization, and the nature of fruit and seeds.

A practical examination shall be held in connection with this subject. The material for examination will consist of two plants, a microscopic section and an animal.

Two examination papers.

Commercial Diploma.

The course for a Commercial Diploma will consist of two Parts (I and II). Part I. will be the same as Part I. of Junior Leaving. Part II. will embrace the following Commercial subjects:—Bookkeeping and Writing; Commercial Transactions, Business forms and usages; Stenography (Theory); Stenography (Dictation). Bookkeeping shall be taken up in six sets as follows:—

Set I. shall show transactions extending over a period of two months; the transactions of the first month being done by Single Entry, and of the second by Double Entry, and showing the change from Single to Double Entry. Books to be used: Day Book (1st month), Journal Day Book (2nd month), Cash Book, Bill Book and Ledger.

Set II. The transactions shall be the same as for Set I., those of the first month being done by Double Entry, and of the second month by Single Entry, and showing the change from Double Entry to Single Entry. Books to be used: Four Column Journal with special columns for Mdse. Purchases and Sales (1st month), Day Book (2nd month), Cash Book, Bill Book and Ledger.

Set III. A Double Entry set with two partners. Books to be used: Journal Day Book with special column for Mdse. Sales, Cash Book, Invoice Book, Bill Book and Ledger, the first three as books of original entry.

Set IV. A Double Entry set; a continuation of Set III., the posting being done in the same ledger. A third partner shall be admitted and the transactions shall include shipments and consignments. Books to be used: Journal Day Book, Cash Book, Invoice Book, Sales Book, Bill Book and Ledger, the first four as books of original entry.

Set V. A Doubly Entry set; a continuation of Set IV., the posting being done in a new ledger. A fourth partner shall be admitted, and the transactions shall include wholesale merchandising, shipment companies and merchandise companies. Books to be used: The same as for Set IV.

Set VI. A set in Manufacturing. Books to be used: Journal Day Book, with a special column for Mdse. Sales, Cash Book, Time Book and Ledger.

The Cash Book shall be a book of original entry in all of the Double Entry sets, various special columns being used in the different sets. A monthly Trial Balance shall be made in connection with Sets III., IV. and V., and Statements of Resources and Liabilities, and of Losses and Gains for all of the sets. The transactions in the different sets shall be different from year to year. The sets may recur tri-ennially, and shall consist of not less than 20 pages of foolscap.

The bookkeeping sets of pupils who write at the examination for a Commercial Diploma shall be examined by the teacher and a report sent to the Education Department.

Business Forms and Usages.—Negotiable paper; promissory notes; special notes; bills of exchange; acceptance; negotiation of bills, notes; cheques; collection of accounts; discharge and dishonor; special forms of due bills and orders; accounts, invoices and statements; interest; partnerships; receipts and releases; banking; and commercial correspondence.

Stenography.—At the examination in dictation in stenography, the candidate shall be required to have attained the rate of fifty words per minute. He shall also be required to transcribe his work into longhand at the rate of twelve words per minute. The dictated matter shall consist of business letters and legal documents.

Four examination papers, each valued at 100.

Schedule D.—Course for Commercial Specialists.

Bookkeeping.—Single and Double entry bookkeeping; wholesale and retail merchandising, commission business, manufacturing; warehousing, steamboating, exchange, joint stock companies, municipalities, societies and public institutions; statements and balance sheets, partnership adjustments, liquidation and administration of estates, auditing, filing papers, the use of special columns and the various other expedients in bookkeeping to save time and labor and secure accuracy of work.

Penmanship.—Theory and practice of penmanship, Spencerian and vertical; ledger headings; marking and engrossing.

Commercial Arithmetic.—Interest, discount, annuities certain, sinking funds, formation of interest and annuity tables, application of logarithms, stocks and investments, partnership settlements, partial payments, equation of payments, and exchange.

Banking.—Money and its substitutes; exchange; incorporation and organization of banks; business of banks, their relation to each other and to the business community; the clearing house system; legal requirements as to capital, shares, reserves, dividends, note issue; insolvency and consequent liability.

Business Forms.—Invoices, accounts, statements, due bills, orders, receipts, warehouse receipts, deposit receipts, deposit slips, bank pass books, promissory notes, bills of

exchange; bank drafts, cheques, bonds, debentures, coupons, instalment scrips, stock certificates, stock transfers, proxies, letters of credit, affidavits, balance sheets, pay sheets, time sheets, and special forms of general bookkeeping, books to suit special cases.

Laws of Business.—Contracts, statute of limitations; negotiable paper and endorsements; sales of personal property; accounts, invoices, statements, etc.; chattel mortgages; real estate and mortgages; interest; agency; partnership; corporations; guarantee and suretyship; receipts and releases; insurance; master and servant; landlord and tenant; bailment; shipping and transportation; host and guest; telegraphs; auctions; patents; copyrights; trade marks and industrial designs; affidavits and declarations, subjects and aliens; wills, and joint stock companies.

Stenography.—The principles of Stenography; writing from dictation at a speed of sixty words per minute, and accurate transcription into longhand at a speed of twelve words per minute; the dictated matter to comprise business correspondence or legal documents.

Drawing.—Object and Model Drawing; Perspective and Geometrical Drawing.

DEPARTMENTAL REGULATIONS.

Approved, August, 1901.

TEXT BOOKS AUTHORIZED FOR USE IN PUBLIC SCHOOLS, HIGH SCHOOLS AND TRAINING SCHOOLS.

1. The text books named in Schedule "A" shall be the authorized text-books for Public Schools. Pupils taking any optional subject in the Public School course may use the text-book authorized in such optional subject. The text-books in French and German are authorized only for schools where the French or German language prevails and where the Trustees, with the approval of the Inspector, require French or German to be taught in addition to English. Text-books marked "optional" shall be introduced into the Public Schools only by resolution of the Board of Trustees. Books authorized in Forms I. and II. of the High School course may be used by pupils taking the corresponding subjects of Continuation Classes.

2. The text-books named in Schedule "B" shall be the only authorized text-books in High Schools and Collegiate Institutes for the course of study prescribed in Forms I., II., and III. Books authorized for use in the Public Schools may be used in Forms I. and II.

3. The text-books named in Schedule "C" shall be the authorized text-books for Model Schools, Normal Schools and the Ontario Normal College. Only such books shall be used by the teachers-in-training as may be ordered by the Principal.

4. Any text-books used in any school on the 1st July, 1901, and recommended by resolution of the Trustees to be continued in use, shall be deemed as authorized in such school until further notice. The vertical or slanting copy books heretofore authorized, and published by the Rose Publishing Company, may be used in any Public School.

5. For religious instruction, either the Sacred Scriptures, or the Scripture Readings adopted by the Education Department, shall be used as prescribed by the Regulations of the Education Department.

Public Schools. (Schedule A.)

First Reader, Part I	$0 10
First Reader, Part II	0 15
Second Reader	0 20
Third Reader	0 30
Fourth Reader	0 40
High School Reader	0 50
Public School Arithmetic	0 25

Public School Algebra and Euclid	0 25
Public School Geography	0 75
Public School Grammar	0 25
Public School History of England and Canada	0 30
History of the Dominion of Canada, Clement (for Fifth Form)	0 50
Public School Drawing Course, each number	0 05
Public School Physiology and Temperance	0 25
Public School Copy Book—Casselman	0 07
Practical Speller—Gage	0 25
Public School Bookeeping (*Black)	0 25
Public School Agriculture	0 30
Public School Domestic Science (optional)	0 50

French-English Readers.

First Reader, Part I	$0 10
First Reader, Part II	0 15
Second Reader	0 25
Third Reader	0 35

German-English Readers.

Ahn's First German Book	$0 25
Ahn's Second German Book	0 45
Ahn's Third German Book	0 45
Ahn's Fourth German Book	0 50
Ahn's First German Reader	0 50

High Schools and Collegiate Institutes. (Schedule B.)

English.

High School Reader	$0 50
High School English Grammar	0 75
High School English Composition	0 50
High School Composition from Models	0 75

History and Geography.

High School Geography	$1 00
High School History of England and Canada	0 65
High School History of Greece and Rome	0 75
Or Myers' Ancient History—Greece and Rome—Canadian Edition	0 75
History of the Dominion of Canada—Clement	0 50

Mathematics.

High School Arithmetic	$0 60
High School Algebra	0 75
Elements of Algebra. McLellan	0 75
High School Euclid (Books I, II, III, 50 cents)	0 75

Classics.

First Latin Book and Reader	$1 00
Primary Latin Book and Reader	1 00
High School Beginner's Greek Book	1 50

Moderns.

High School French Grammar and Reader	$1 00
High School German Grammar and Reader	1 00

**The book of forms, prepared by the same author to accompany this work, is not compulsory but optional only.*

Science

High School Physical Science, Part I., 50 cents; Part II.	$0 75
High School Botany, Part II.	0 60
High School Chemistry	0 50

Bookkeeping and Drawing.

High School Bookkeeping	$0 60
High School Drawing Course, each number	0 10

Cadet Drill.

High School Cadet Driill (optional)	$0 40

TRAINING SCHOOLS. (SCHEDULE C.)

County Model Schools.

School Management, Millar	$1 00
Methods in Teaching. Edited by Tilley	1 50
Public School Physiology and Temperance	0 25
Psychology applied to Teaching, Baldwin	1 50
Hand Book of Method for Teaching Phonic Reading, MacCabe	0 50
Steps in the Phonic System, Cullin & Niven	0 50
Elementary Phonetics, Burt	0 35
Elementary Treatise on Arithmetic, Taylor	0 50
Mental Arithmetic, McLellan & Ames	0 30
Algebraical Exercises, Barnes	0 30
Introductory Geometry, MacLean	0 50

Normal Schools.

Lectures on Teaching, Fitch	$1 00
School Management, Millar	1 00
Educational Reformers, Quick	1 50
Applied Psychology, McLellan	1 00
First Year at School, Sinclair	0 50
High School Cadet Drill Manual	0 40
Hints on Teaching Arithmetic, McLean	0 50
Public School Domestic Science	0 50

Ontario Normal College.

Applied Psycology, McLellan	1 00
Education, Spencer	0 50
School Management, Millar	1 00
School Management, Landon	1 50
Educational Reformers, Quick	1 50
High School Cadet Drill Manual	0 40
Physical Culture, Houghton	0 50
Physical Education, McLaren, Part II., sections II. and III.	2 00

TEACHERS' READING COURSE FOR 1902. (SCHEDULE D.)

Dickens as an Educator, Hughes	$1 50
The Art of Study, Hinsdale	1 00
Canada under British Rule, Bourinot	1 25

NOTE—Candidates for admission to the Normal Schools in August, 1902, and in January, 1903, will be examined on the books in the Teachers' Reading Course as above.

APPORTIONMENT OF THE LEGISLATIVE PUBLIC SCHOOL GRANT FOR 1901.

The apportionment of the Grant to the several municipalities is based upon the latest Returns of Population for the year 1901, and the division between the Public and Separate Schools on the average attendance of that year, as reported by the Inspectors, Public School Boards, and Separate School Trustees respectively.

While the Separate Schools will receive their portion of the Grant direct from the Department, that of the Public Schools will be paid, according to this Schedule, through the respective County, City, Town, and Village Treasurers.

Under the provisions of Section 5 of "An Act respecting the Education Department, 1901," the Education Department is empowered "to appropriate out of moneys voted by the Legislature for public and separate schools, a sum not exceeding $5.00 for every school in which the Regulations of the Department as to equipment, ventilation, heating, lighting and the care of the premises generally have been complied with."

Each County Inspector is therefore authorized to deduct from the apportionment of each township such an amount as will provide the sum of $5.00 to be paid on his order to each Trustee Board that has complied with the requirements mentioned.

TORONTO, May, 1901.

PUBLIC SCHOOL APPORTIONMENT TO COUNTIES FOR 1901.

1. COUNTY OF BRANT.

Municipalities.	*Apportionment.*
Brantford	$658 00
Burford	526 00
Dumfries, South	317 00
Oakland	84 00
Onondaga	136 00
Total	$1,721 00

2. COUNTY OF BRUCE.

Albemarle	$180 00
Amabel	329 00
Arran	303 00
Brant	470 00
Bruce	374 00
Carrick	322 00
Culross	252 00
Eastnor	201 00
Elderslie	280 00
Greenock	272 00
Huron	391 00
Kincardine	485 00
Kinloss	293 00
Lindsay and St. Edmunds	87 00
Saugeen	178 00
Total	$4,417 00

3. COUNTY OF CARLETON.

Fitzroy	$311 00
Gloucester	507 00
Goulbourn	310 00
Gower North	272 00
Huntley	271 00
March	110 00
Marlborough	190 00
Nepean	472 00
Osgoode	527 00
Torbolton	114 00
Total	$3,084 00

4. COUNTY OF DUFFERIN.

Municipalities.	*Apportionment.*
Amaranth	$318 00
Garafraxa, East	220 00
Luther, East	219 00
Melancthon	428 00
Mono	386 00
Mulmur	359 00
Total	$1,930 00

5. COUNTY OF ELGIN.

Aldborough	$545 00
Bayham	431 00
Dorchester, South	182 00
Dunwich	394 00
Malahide	458 00
Southwold	456 00
Yarmouth	581 00
Total	$3,047 00

6. COUNTY OF ESSEX.

Anderdon	$190 00
Colchester, North	228 00
" South	340 00
Gosfield, North	243 00
" South	292 00
Maidstone	279 00
Malden	100 00
Mersea	514 00
Pelee Island	76 00
Rochester	211 00
Sandwich East	169 00
" West	279 00
" South	201 00
Tilbury, North	252 00
" West	272 00
Total	$3,646 00

7. COUNTY OF FRONTENAC.

Municipalities.	*Apportionment.*
Barrie	$54 00
Bedford	178 00
Clarendon and Miller	107 00
Garden Island	32 00
Hinchinbrooke	150 00
Howe Island	
Kennebec	154 00
Kingston	289 00
Loughborough	171 00
Olden	133 00
Oso	133 00
Palmerston and Canonto	104 00
Pittsburg	262 00
Portland	265 00
Storrington	213 00
Wolf Island	127 00
Total	$2,382 00

8. COUNTY OF GREY.

Artemesia	$431 00
Bentinck	405 00
Collingwood	448 00
Derby	232 00
Egremont	391 00
Euphrasia	399 00
Glenelg	293 00
Holland	387 00
Keppel	439 00
Normanby	509 00
Osprey	405 00
Proton	353 00
Sarawak	154 00
St. Vincent	346 00
Sullivan	405 00
Sydenham	408 00
Total	$6,005 00

9. COUNTY OF HALDIMAND.

Canborough	$113 00
Cayuga North	187 00
" South	95 00
Dunn	102 00
Moulton	224 00
Oneida	181 00
Rainham	202 00
Seneca	224 00
Sherbrooke	47 00
Walpole	516 00
Total	$1,891 00

10. COUNTY OF HALIBURTON

Anson and Hindon	$ 33 00
Cardiff	72 00
Dudley, Dysart, Harcourt, Harburn, Guilford	122 00
Glamorgan	64 00
Livingstone	5 00
Lutterworth	55 00
McClintock	6 00
Minden	150 00
Monmouth	64 00

10. COUNTY OF HALIBURTON.—*Con.*

Municipalities.	*Apportionment.*
Nightingale	1 00
Sherbourne	17 00
Snowdon	95 00
Stanhope	53 00
Total	$749 00

11. COUNTY OF HALTON.

Esquesing	$458 00
Nassagaweya	280 00
Nelson	331 00
Trafalgar	419 00
Total	$1,488 00

12. COUNTY OF HASTINGS.

Carlow	$ 75 00
Dungannon	86 00
Elzevir and Grimsthrope	160 00
Faraday	131 00
Hungerford	430 00
Huntingdon	303 00
McClure, Wicklow and Bangor	125 00
Herschel and Monteagle	223 00
Madoc	327 00
Marmora and Lake	138 00
Mayo	69 00
Rawdon	387 00
Sidney	489 00
Thurlow	517 00
Tudor and Cashel	104 00
Limerick	69 00
Wollaston	89 00
Tyendinaga	387 00
Total	$4,109 00

13. COUNTY OF HURON.

Ashfield	$343 00
Colborne	222 00
Goderich	297 00
Grey	418 00
Hay	383 00
Howick	466 00
Hullett	339 00
McKillop	313 00
Morris	306 00
Stanley	264 00
Stephen	463 00
Tuckersmith	303 00
Turnberry	266 00
Usborne	287 00
Wawanosh, East	238 00
" West	238 00
Total	$5,146 00

14. COUNTY OF KENT.

Camden	$311 00
Chatham	628 00
Dover	443 00
Harwich	531 00
Howard	435 00
Orford	313 00
Raleigh	500 00
Romney	228 00

14. COUNTY OF KENT.—*Con.*

Municipalities.	*Apportionment.*
Tilbury, East	410 00
Zone	148 00
Total	$3,947 00

15. COUNTY OF LAMBTON.

Bosanquet	$300 00
Brooke	398 00
Dawn	417 00
Enniskillen	593 00
Euphemia	272 00
Moore	566 00
Plympton	413 00
Sarnia	256 00
Sombra	442 00
Warwick, including $92 arrears	519 00
Total	$4,176 00

16. COUNTY OF LANARK.

Bathurst	$301 00
Beckwith	203 00
Burgess, North	55 00
Dalhousie and Sherbrooke, North	213 00
Darling	89 00
Drummond	234 00
Emsley, North	117 00
Lanark	209 00
Lavant	60 00
Montague	272 00
Packenham	209 00
Ramsay	257 00
Sherbrooke, South	100 00
Total	$2,319 00

17. COUNTY OF LEEDS.

Bastard and Burgess, South	$336 00
Crosby, North	138 00
" South	196 00
Elizabethtown	474 00
Elmsley, South	92 00
Kitley	233 00
Leeds and Landsdowne, Front	329 00
" " Rear	282 00
Yonge and Escott, Rear	123 00
Yonge, Front and Escott	270 00
Total	$2,473 00

17. (*a*). COUNTY OF GRENVILLE.

Augusta	$437 00
Edwardsburg	457 00
Gower, South	97 00
Oxford, Rideau	369 00
Wolford	216 00
Total	$1,576 00

18. COUNTY OF LENNOX AND ADDINGTON.

Adolphustown	$ 60 00
Amherst Island	95 00
Anglesea Effingham and Kaladar	155 00
Camden, East	648 00

18. COUNTY OF LENNOX AND ADDINGTON.—*Con.*

Municipalities.	*Apportionment.*
Denbigh, Abinger and Ashley	127 00
Ernesttown	389 00
Fredericksburg, North	174 00
" South	128 00
Richmond	251 00
Sheffield	216 00
Total	$2,243 00

19. COUNTY OF LINCOLN.

Caistor	$230 00
Clinton	238 00
Gainsborough	280 00
Grantham	223 00
Grimsby, North	137 00
" South	173 00
Louth	202 00
Niagara	215 00
Total	$1,698 00

20. COUNTY OF MIDDLESEX.

Adelaide	$264 00
Biddulph	268 00
Caradoc	485 00
Delaware	197 00
Dorchester, North	433 00
Ekfrid	326 00
Lobo	331 00
London	1,049 00
McGillivray	275 00
Metcalfe	187 00
Mosa	312 00
Nissouri, West	322 00
Westminister	506 00
Williams, East	181 00
" West	165 00
Total	$5,301 00

21. COUNTY OF NORFOLK.

Charlotteville	$405 00
Houghton	250 00
Middleton	331 00
Townsend	453 00
Walsingham, North	276 00
" South	212 00
Windham	420 00
Woodhouse	230 00
Total	$2,577 00

22. COUNTY OF NORTHUMBERLAND.

Alnwick	$127 00
Brighton	303 00
Cramahe	300 00
Haldimand	436 00
Hamilton	487 00
Monaghan, South	105 00
Murray	334 00
Percy	354 00
Seymour	358 00
Total	$2,804 00

22. (*a*). COUNTY OF DURHAM.

Municipalities.	*Apportionment.*
Cartwright	$215 00
Cavan	326 00
Clarke	456 00
Darlington	505 00
Hope	403 00
Manvers	352 00
Total	$2,257 00

23. COUNTY OF ONTARIO.

Brock	$435 00
Mara	287 00
Pickering	658 00
Rama	147 00
Reach	429 00
Scott	269 00
Scugog Island	58 00
Thorah	162 00
Uxbridge	336 00
Whitby, East	311 00
Whitby	254 00
Total	$3,346 00

24. COUNTY OF OXFORD.

Blandford	$190 00
Blenheim	522 00
Dereham	457 00
Nissouri, East	294 00
Norwich, North	272 00
" South	286 00
Oxford, North	153 00
" East	232 00
" West	252 00
Zorra, East	476 00
" West	262 00
Total	$3,396 00

25. COUNTY OF PEEL.

Albion	$312 00
Caledon	461 00
Chinguacousy	479 00
Gore of Toronto	99 00
Toronto	627 00
Total	$1,978 00

26. COUNTY OF PERTH.

Blanchard	$350 00
Downie	307 00
Easthope, North	270 00
" South	236 00
Ellice	354 00
Elma	414 00
Fullarton	273 00
Hibbert	246 00
Logan	338 00
Mornington	326 00
Wallace	342 00
Total	$3,456 00

27. COUNTY OF PETERBOROUGH.

Municipalities.	*Apportionment.*
Anstruther	$ 27 00
Asphodel	219 00
Belmont	214 00
Burleigh	49 00
Cavendish	19 00
Chandos	90 00
Douro	247 00
Drummer	242 00
Ennismore	87 00
Galway	119 00
Harvey	131 00
Methuen	31 00
Monaghan, North	111 00
Otonabee	404 00
Smith	316 00
Total	$2,306 00

28. COUNTY OF PRESCOTT.

Alfred	37 00
Caledonia	118 00
Hawkesbury, East	291 00
" West	325 00
Longueuil	66 00
Plantagenet, North	362 00
" South	217 00
Total	$1,416 00

28 (*a*). COUNTY OF RUSSELL.

Cambridge	$161 00
Clarence	142 00
Cumberland	312 00
Russell	186 00
Total	$801 00

29. COUNTY OF PRINCE EDWARD.

Ameliasburg	$369 00
Athol	135 00
Hallowell	352 00
Hillier	189 00
Marysburg, North	140 00
" South	146 00
Sophiasburg	228 00
Total	$1,559 00

30. COUNTY OF RENFREW.

Admaston	$254 00
Algona, South	114 00
Alice and Fraser	240 00
Bagot and Blithfield	165 00
Brougham	56 00
Bromley	162 00
Brudenell and Lynedoch	165 00
Grattan	232 00
Griffith and Matawatchan	37 00
Hagarty, Jones, Sherwood, Richards and Burns	307 00
Head, Clara and Maria	44 00
Horton	176 00
McNab	417 00
Pembroke	89 00

30. COUNTY OF RENFREW.—*Con.*

Municipalities.	*Apportionment.*
Petewawa	117 00
Radcliffe and Raglan	116 00
Rolph, Wylie, McKay, Buchanan	128 00
Ross	345 00
Sebastopol	90 00
Stafford	105 00
Westmeath	421 00
Wilberforce and Algona, North	266 00
Total	$4,046 00

31. COUNTY OF SIMCOE.

Adjala	$240 00
Essa	525 00
Flos	413 00
Gwillimbury, West	287 00
Innisfil	437 00
Matchedash	56 00
Medonte	477 00
Nottawasaga	665 00
Orillia	427 00
Oro	480 00
Sunnidale	273 00
Tay	519 00
Tiny	360 00
Tecumseth	397 00
Tossorontio	199 00
Vespra	363 00
Total	$6,118 00

32. COUNTY OF STORMONT.

Cornwall	$634 00
Finch	329 00
Osnabruck	582 00
Roxborough	424 00
Total	$1,969 00

32 (*a*). COUNTY OF DUNDAS.

Matilda	$473 00
Mountain	407 00
Williamsburg	459 00
Winchester	379 00
Total	$1,718 00

32 (*b*). COUNTY OF GLENGARRY.

Charlottenburg	$528 00
Kenyon	476 00
Lancaster	407 00
Lochiel	463 00
Total	$1,874 00

33. COUNTY OF VICTORIA.

Bexley	$106 00
Carden	87 00
Dalton	60 00
Eldon	361 00
Emily	253 00
Fenelon	281 00

33. COUNTY OF VICTORIA.—*Con.*

Municipalities.	*Apportionment.*
Laxton, Digby and Longford	94 00
Mariposa	482 00
Ops	266 00
Somerville	227 00
Verulam	221 00
Total	$2,438 00

34. COUNTY OF WATERLOO.

Dumfries, North	$254 00
Waterloo	812 00
Wellesley	471 00
Wilmot	572 00
Woolwich	492 00
Total	$2,601 00

35. COUNTY OF WELLAND.

Bertie	$370 00
Crowland	118 00
Humberstone	363 00
Pelham	287 00
Stamford	238 00
Thorold	216 00
Wainfleet	329 00
Willoughby	115 00
Total	$2,306 00

36. COUNTY OF WELLINGTON.

Arthur	$283 00
Eramosa	326 00
Erin	394 00
Garafraxa, West	284 00
Guelph	271 00
Luther, West	258 00
Maryborough	365 00
Minto	366 00
Nichol	188 00
Peel	457 00
Pilkington	172 00
Puslinch	409 00
Total	$3,773 00

37. COUNTY OF WENTWORTH.

Ancaster	$471 00
Barton	440 00
Beverly	495 00
Binbrook	171 00
Flamborough, East	301 00
" West	342 00
Glanford	195 00
Saltfleet	359 00
Total	$2,774 00

38. COUNTY OF YORK.

Etobicoke	$435 00
Georgina	203 00
Gwillimbury, East	380 00
" North	162 00

38. COUNTY OF YORK.—*Con.*

Municipalities.	*Apportionment.*
King	642 00
Markham	622 00
Scarborough	457 00
Vaughan	535 00
Whitchurch	432 00
York	1,028 00
Total	$4,896 00

39. DISTCICTS.

Municipalities.	*Apportionment.*
Algoma, Muskoka, Nipissing, Parry Sound (Including rural separate schools but not schools in towns and villages named in this list.)	$35,000 00
Total	$35,000 00

Apportionment to Roman Catholic Separate Schools for 1901, Payable through this Department.

School Sections.		*Apportionment.*
Adjala	10	$20 00
Alfred	3	23 00
"	6	30 00
"	7, (with 8, Plantagenet, South)	13 00
"	7	30 00
"	8	29 00
"	9	27 00
"	10	80 00
"	11	20 00
"	12	26 00
"	13	25 00
"	14	18 00
"	15	20 00
Admaston	4	19 00
Anderdon	2, 5 and 8	30 00
"	3 and 4	15 00
Arthur	6	31 00
"	10	31 00
Ashfield	2	47 00
Aspodel	4	13 00
Augusta	15	13 00
Balfour	1 (District of Algoma)	....
Biddulph	3 (to be app'd)	
"	4 "	
"	6	14 00
"	9 (with 1 McGillivray)	8 00
Bonfield, 1A, 1B, 2, 4 (District of Nipissing)		....
Brant (with 3 Greenock)	2	11 00
Brighton	1 (15)	13 00
Bromley	4	26 00
"	6	21 00
"	7	37 00
Brougham	1	15 00
Burgess, North	2	28 00
"	4	14 00
"	6	10 00
Caledonia	3, 4 and 10	15 00
"	6 (with 7 Plantagenet S.)	10 00
"	10	24 00
"	12	11 00
"	13	26 00
Cambridge	3	28 00
"	4	25 00
"	5	36 00
"	6	25 00
"	6 and 7	40 00
Carrick	1	36 00
" (with 1 Culross)	1	70 00
"	2	17 00
" (with 2 Culross)	2	19 00
"	4	33 00
"	14	109 00
Charlottenburg	15	$38 00
"	16	27 00
Chisholm and Boulter.	1 (Nipissing)	
Chisholm	2 "	
Clarence	5	91 00
"	6	58 00
"	8	41 00
"	11	24 00
"	12	24 00
"	13	13 00
"	14	26 00
"	16	18 00
"	17	21 00
"	19	17 00
"	20	21 00
"	21	32 00
Cornwall	1	20 00
"	16	45 00
Crosby, North	4	62 00
"	7	5 00
Culross (with 1 Carrick)	1	79 00
" (with 2 Carrick)	2	21 00
Cumberland	10	16 00
"	11	20 00
"	13	20 00
"	14	31 00
Downie	9	28 00
Dover	3	47 00
"	7	32 00
"	9 (to be app'd)	
Dunnett and Rutter, 1 (District of Nipissing)		....
Edwardsburg	2	9 00
Ellice	7	19 00
Ferris, 3 (District of Nipissing)		....
" 4 "	"	....
Finch	5	41 00
Flamborough, West	2	13 00
Greenock, 3 (with 2 Brant)		58 00
Glenelg	5	19 00
"	7	25 00
Gloucester, 1 (with 3 Osgoode)		13 00
"	4, 5 and 12	10 00
"	14	30 00
"	15	73 00
"	17	4 00
"	20	29 00
"	22	15 00
"	25	83 00
"	26	22 60
Griffith, etc.	3	18 00
Hagarty	4	44 00
Haldimand	2	28 00

APPORTIONMENT TO ROMAN CATHOLIC SEPARATE SCHOOLS FOR 1901, PAYABLE THROUGH THIS DEPARTMENT.—*Continued.*

School Sections.	*Apportionment.*	
Haldimand	14	$16 00
Harwich	9	24 00
Hawkesbury, East	2	64 00
"	4	12 00
"	6	21 00
"	7	91 00
"	10	55 00
"	11	19 00
"	12	16 00
"	15	25 00
"	16	9 00
Hay	1	42 00
Hibbert	(1) 3	15 00
Howe Island	1	10 00
"	2	19 00
"	3	13 00
Holland, etc	3	8 00
Hullett	2	11 00
Keewatin....1 (see Dist. of Algoma)		....
Kingston	8	17 00
Lancaster	14	28 00
Lochiel	12A	32 00
"	12B	46 00
Longueuil, West	2	17 00
"	4A	18 00
"	7	22 00
Loughboro'	2	17 00
"	10	20 00
Maidstone	1	53 00
" ....4 (with 2 Rochester)		19 00
Malden	3A	36 00
"	3B	23 00
Mara	3	62 00
March	3	29 00
Marmora and Lake	1	2 00
Matawatchan	4	35 00
Moore	3, 4 and 5	12 00
Mornington	4	33 00
McGillivray .....1 (with 9 Biddulph		9 00
McKillop	1	14 00
Nepean	7	31 00
"	15	78 00
Nichol	1	20 00
Normanby	5	23 00
"	10	12 00
Osgoode	1	21 00
"	2 (15)	9 00
" .....3 (with 1 Gloucester)		16 00
Papineau....1 (see Dist. of Nipissing)		....
" ....2A " "		....
" ....2B " "		....
Peel	8	3 00
"	12	15 00
Percy	5	11 00
" .....12 (with 12 Seymour)		4 00
Plantagenet, North	4	23 00
" "	7	18 00
" "	8	23 00
" "	9	23 00
" "	12	12 00
" South	4	42 00
" "	7	36 00
" " 7 (with 6 Caledonia)		15 00
" "	8	23 00
" " 8 (with 7 Alfred)		10 00
Proton	6	$14 00
Raleigh	4	12 00
"	5	24 00
"	6	18 00
Rayside....1 (with 1 Balfour) Algoma.		
Richmond	10 and 17	17 00
Rochester .....2 (with 4 Maidstone)		27 00
"	6	(to be app'd)
"	7	76 00
Roxboro'	12	69 00
"	16	24 00
Russell	1	7 00
"	4	11 00
"	6	90 00
"	7	20 00
"	8	33 00
"	13	(to be app'd)
Sandwich, East	1	88 00
"	2	19 00
"	4	(to be app'd)
Sandwich, West	6 and 9	26 00
Seymour.....12 (with 12 Percy)		5 00
Sheffield	5	33 00
Sherwood	6	(to be app'd)
Sombra	5	22 00
Stafford	2	27 00
Stephen	6	41 00
Springer....2 (District of Nipissing)		....
" ....3 " "		....
Sunnidale	6	(to be app'd)
Sydenham	7	11 00
Tilbury, N.	1	(to be app'd)
"	2	do
"	6	do
"	10 and 11	do
Tiny	2	108 00
Toronto Gore	6	20 00
Tyendinga	18	15 00
"	20	22 00
"	24	19 00
"	28	9 00
"	30	17 00
Vespra	7	6 00
Waterloo	13	52 60
Wawanosh, West	1	15 00
Wellesley	5	14 00
"	9 and 10	35 60
"	11	79 00
"	12	6 00
Westminster	13	9 00
Widdifield....2 (Disrrict of Nipissing)		....
Williams, West	10	22 00
Wilmot	15½	59 00
Winchester ....12 (with 1 Russell)		8 00
Windham	8	47 00
Wolfe Island	1	7 00
"	2	19 00
"	4	33 00
"	7	12 00
Woolwich	10	42 00
Yonge and Escott R	4	17 00
York	1	32 00
		$9,631 00

APPORTIONMENT TO CITIES, TOWNS AND VILLAGES FOR 1901.

Cities.	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
Belleville	1,011 00	284 00	1,295 00
Brantford	1,780 00	225 00	2,005 00
Chatham	910 00	171 00	1,081 00
Guelph	1 104 00	262 00	1,366 00
Hamilton	5.506 00	983 00	6,489 00
Kingston	1,767 00	471 00	2,238 00
London	4,231 00	581 00	4,812 00
Ottawa	3,494 00	3,675 00	7,169 00
St. Catharines	1,032 00	245 00	1,277 00
St. Thomas	1,218 00	140 00	1,358 00
Stratford	1,100 00	226 00	1,326 00
Toronto	21,404 00	3,118 00	24,522 00
Windsor	1,494 00	.....	1,494 00
Total	$46,051 00	$10,381 00	$56,432 00
Towns.			
Alliston	219 00	.....	219 00
Almonte	277 00	110 00	387 00
Amherstburg	131 00	123 00	254 00
Arnprior	295 00	172 00	467 00
Aurora	185 00	.....	185 00
Aylmer	271 00	.....	271 00
Barrie	642 00	100 00	742 00
Berlin	932 00	263 00	1,195 00
Blenheim	206 00	.....	206 00
Bothwell	103 00	.....	103 00
Bowmanville	350 00	.....	350 00
Bracebridge	284 00	.....	284 00
Brampton	347 00	.....	347 00
Brockville	938 00	160 00	1,098 00
Carleton Place	496 00	.....	496 00
Clinton	300 00	.....	300 00
Cobourg	372 00	145 00	517 00
Collingwood	688 00	.....	688 00
Cornwall	302 00	445 00	747 00
Deseronto	466 00	.....	466 00
Dresden	195 00	.....	195 00
Dundas	184 00	75 00	259 00
Dunnville	261 00	.....	261 00
Durham	163 00	.....	163 00
Essex	173 00	.....	173 00
Forest	194 00	.....	194 00
Fort William	530 00	.....	530 00
Galt	898 00	56 00	954 00
Gananoque	443 00	.....	443 00
Goderich	442 00	57 00	499 00
Gore Bay	123 00	.....	123 00
Gravenhurst	229 00	.....	229 00
Harriston	216 00	.....	216 00
Hawkesbury	49 00	213 00	262 00
Hespeler	310 00	.....	310 00
Ingersoll	526 00	71 00	597 00
Kincardine	263 00	.....	263 00
Leamington	378 00	.....	378 00
Lindsay	706 00	206 00	912 00
Listowel	310 00	.....	310 00
Little Current	80 00	.....	80 00
Mattawa	53 00	158 00	211 00
Meaford	233 00	.....	233 00
Midland	277 00	.....	277 00

APPORTIONMENT TO CITIES, TOWNS AND VILLAGES FOR 1901.

Towns—*Continued.*	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
Mitchell	257 00	.....	257 00
Milton	158 00	.....	158 00
Mount Forest	270 00	.....	270 00
Napanee	362 00	.....	362 00
Newmarket	242 00	41 00	283 00
Niagara	169 00	.....	169 00
Niagara Falls	412 00	90 00	502 00
North Bay	191 00	97 00	288 00
North Toronto	194 00	.....	194 00
Oakville	190 00	20 00	210 00
Orangeville	502 00	.....	502 00
Orillia	462 00	113 00	575 00
Oshawa	503 00	59 00	562 00
Owen Sound	1,017 00	74 00	1 091 00
Palmerston	220 00	.....	220 00
Parkhill	138 00	35 00	173 00
Paris	360 00	48 00	408 00
Parry Sound	208 00	.....	208 00
Preston	233 00	48 00	281 00
Pembroke	345 00	273 00	618 00
Penetanguishene	295 00	.....	295 00
Perth	321 00	135 00	456 00
Peterborough	922 00	418 00	1,340 00
Petrolea	581 00	.....	581 00
Picton	405 00	38 00	443 00
Port Arthur	249 00	93 00	342 00
Port Hope	554 00	.....	554 00
Prescott	265 00	158 00	423 00
Rat Portage	511 00	161 00	672 00
Renfrew	215 00	161 00	376 00
Ridgetown	283 00	.....	283 00
Sandwich	165 00	in town grant	165 00
Sarnia	752 00	106 00	858 00
Sault Ste. Marie	437 00	80 00	517 00
Seaforth	299 00	.....	299 00
Simcoe	360 00	.....	360 00
Smith's Falls	638 00	.....	638 00
Stayner	143 00	.....	143 00
Sturgeon Falls	49 00	63 00	112 00
St. Mary's	379 00	41 00	420 00
Strathroy	376 00	.....	376 00
Sudbury	90 00	87 00	186 00
Thessalon	103 00	.....	103 00
Thornbury	91 00	.....	91 00
Thorold	162 00	72 00	234 00
Tilsonburg	256 00	.....	256 00
Toronto Junction	660 00	.....	660 00
Trenton	357 00	151 00	508 00
Uxbridge	208 00	.....	208 00
Vankleekhill	152 00	131 00	283 00
Walkerton	270 00	114 00	384 00
Walkerville	143 00	.....	143 00
Wallaceburg	291 00	61 00	352 00
Waterloo	378 00	62 00	440 00
Welland	226 00	.....	226 00
Whitby	247 00	28 00	275 00
Wiarton	253 00	.....	253 00
Wingham	269 00	.....	269 00
Woodstock	1,148 00	.....	1,148 00
Totals	$34,985 00	$5,412 00	$40 397 00

APPORTIONMENT TO CITIES, TOWNS AND VILLAGES FOR 1901.

Incorporated Villages.	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
Acton	182 00		182 00
Ailsa Craig	88 00		88 00
Alexandria	39 00	167 00	206 00
Alvinston	124 00		124 00
Arkona	54 00		54 00
Arthur	95 00	80 00	175 00
Athens	118 00		118 00
Ayr	103 00		103 00
Ashburnham	211 00		211 00
Bath	43 00		43 00
Bayfield	70 00		70 00
Beamsville	100 00		100 00
Beaverton	89 00		89 00
Beeton	93 00		93 00
Belle River	15 00	57 00	72 00
Blyth	108 00		108 00
Bobcaygeon	106 00		106 00
Bolton	77 00		77 00
Bradford	112 00		112 00
Bridgeburg	149 00		149 00
Brighton	171 00		171 00
Brussels	151 00		151 00
Burk's Falls	87 00		87 00
Burlington	141 00		141 00
Caledonia	113 00		113 00
Campbellford	303 00		303 00
Cannnington	154 00		154 00
Cardinal	162 00		162 00
Casselman	22 00	93 00	115 00
Cayuga	148 00		148 00
Chesley	211 00		211 00
Chesterville	104 00		104 00
Chippawa	57 00		57 00
Clifford	75 00		75 00
Colborne	124 00		124 00
Creemore	78 00		78 00
Delhi	102 00		102 00
Drayton	98 00		98 00
Dundalk	98 00		98 00
Dutton	96 00		96 00
East Toronto	185 00		185 00
Eganville	60 00	64 00	124 00
Elmira	134 00		134 00
Elora	125 00	21 00	146 00
Embro	73 00		73 00
Erin	64 00		64 00
Exeter	227 00		227 00
Fenelon Falls	139 00		139 00
Fergus	172 00	13 00	185 00
Fort Erie	102 00		102 00
Garden Island	35 00		35 00
Georgetown	177 00		177 00
Glencoe	117 00		117 00
Grand Valley	99 00		99 00
Grimsby	105 00		105 00
Hagersville	112 00		112 00
Hastings	55 00	40 00	95 00
Hanover	187 00		187 00
Havelock	117 00		117 00
Hensall	110 00		110 00

APPORTIONMENT TO CITIES, TOWNS AND VILLAGES FOR 1901.

Incorporated Villages.—*Continued.*	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
Hintonburg	139 00	139 00	278 00
Holland Landing	53 00		53 00
Huntsville	153 00		153 00
Iroquois	148 00		148 00
Kemptville	176 00		176 00
Kingsville	169 00		169 00
Lakefield	138 00		138 00
Lanark	112 00		112 00
Lancaster	66 00		66 00
L'Orignal	110 00	38 00	148 00
London, West	241 00		241 00
Lucan	106 00		106 00
Lucknow	183 00		183 00
Madoc	130 00		130 00
Markdale	107 00		107 00
Markham	116 00		116 00
Marmora	113 00		113 00
Maxville	84 00		84 00
Merrickville	119 00		119 00
Merriton	163 00	45 00	208 00
Millbrook	108 00		108 00
Milverton	85 00		85 00
Morrisburg	198 00		198 00
Newboro'	54 00		54 00
Newburg	78 00		78 00
Newbury	55 00		55 00
Newcastle	61 00		61 00
New Hamburg	150 00		150 00
Niagara Falls, South	168 00		168 00
Norwich	169 00		169 00
Norwood	120 00		120 00
Oil Springs	125 00		125 00
Omemee	76 00		76 00
Ottawa, East	136 00		136 00
Paisley	125 00		125 00
Point Edward	128 00		128 00
Portsmouth	49 00	33 00	82 00
Port Carling	33 00		33 00
Port Colborne	140 00		140 00
Port Dalhousie	89 00	26 00	115 00
Port Dover	136 00		136 00
Port Elgin	174 00		174 00
Port Perry	178 00		178 00
Port Rowan	80 00		80 00
Port Stanley	62 00		62 00
Richmond	55 00		55 00
Richmond Hill	77 00		77 00
Rockland	27 00	134 00	161 00
Shelburne	180 00		180 00
Southampton	206 00		206 00
Springfield	59 00		59 00
Stirling	96 00		96 00
Stouffville	158 00		158 00
Streetsville	65 00		65 00
Sturgeon Point	40 00		40 00
Sundridge	44 00		44 00
Sutton	75 00		75 00
Tara	90 00		90 00
Teeswater	114 00		114 00
Thamesville	110 00		110 00

APPORTIONMENT TO CITIES, TOWNS AND VILLAGES FOR 1901.

Incorporated Villages.	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
Thedford	74 00		74 00
Tilbury	64 00	63 00	127 00
Tiverton	57 00		57 00
Tottenham	71 00		71 00
Tweed	113 00	27 00	140 00
Vienna	43 00		43 00
Wardsville	40 00		40 00
Waterdown	82 00		82 00
Waterford	131 00		131 00
Watford	170 00		170 00
Wellington	75 00		75 00
Weston	108 00	16 00	124 00
Winchester	133 00		133 00
Woodbridge	77 00		77 00
Woodville	66 00		66 00
Wyoming	94 00		94 00
Wroxeter	54 00		54 00
Total	15,117 00	1,056 00	16,173 00

SUMMARY OF APPORTIONMENT FOR 1901.

Counties.	Public Schools.	Separate Schools.	Total.
1. Brant	1,721 00		1,721 00
2. Bruce	4,417 00	453 00	4,870 00
3. Carleton	3,084 00	463 00	3,547 00
4. Dufferin	1,930 00		1,930 00
5. Elgin	3,047 00		3,047 00
6. Essex	3,646 00	412 00	4,058 00
7. Frontenac	2 382 00	167 00	2,549 00
8. Grey	6,005 00	112 00	6,117 00
9. Haldimand	1,891 00		1,891 00
10. Haliburton	740 00		740 00
11. Halton	1,488 00		1,488 00
12. Hastings	4,109 00	84 00	4,193 00
13. Huron	5,146 00	170 00	5,316 00
14. Kent	3,947 00	157 00	4,104 00
15. Lambton	4,176 00	34 00	4,210 00
16. Lanark	2,319 00	52 00	2,371 00
17. Leeds and Grenville	4,049 00	106 00	4,155 00
18. Lennox and Addington	2 243 00	50 00	2,293 00
19. Lincoln	1,698 00		1,698 00
20. Middlesex	5,301 00	62 00	5,363 00
21. Norfolk	2,577 00	47 00	2,624 00
22. Northumberland and Durham	5,061 00	77 00	5,138 00
23. Ontario	3,346 00	62 00	3,408 00
24. Oxford	3,396 00		3,396 00
25. Peel	1,978 00	20 00	1,998 00
26. Perth	3,456 00	95 00	3,551 00
27. Peterborough	2,306 00	13 00	2,319 00
28. Prescott and Russel	2,217 00	1,809 00	4,026 00
29. Prince Edward	1,559 00		1,559 00
30. Renfrew	4,046 00	242 00	4,288 00
31. Simcoe	6,118 00	134 00	6,252 00

SUMMARY OF APPORTIONMENT FOR 1901.—*Continued.*

Counties.	Public Schools.	Separate Schools.	Total.
	$ c.	$ c.	$ c.
32. Stormont, Dundas and Glengarry	5,561 00	378 00	5,939 00
33. Victoria	2,438 00	.....	2,438 00
34. Waterloo	2,601 00	287 00	2,888 00
35. Welland	2,036 00	.....	2,036 00
36. Wellington	3,773 00	100 00	3,873 00
37. Wentworth	2,774 00	13 00	2,787 00
38. York	4,896 00	32 00	4,928 00
Total	123,478 00	5,631 00	129,109 00
39. Districts—			
(*a*) Algoma ... (*b*) Muskoka.... (*c*) Nipissing ... (*d*) Parry Sound. — Exclusive of the towns and villages which appear in the general list on preceding pages	33,800 00	1,200 00	35,000 00
Total	33,800 00	1,200 00	35,000 00
Grand totals.			
Counties	123 478 00	5,631 00	129,109 00
Cities	46,051 00	10,381 00	56,432 00
Towns	34,985 00	5,412 00	40,397 00
Villages	15,117 00	1,056 00	16,173 00
Districts	33,800 00	1,200 00	35,000 00
Totals	253,431 00	23,680 00	277,111 00

II. ORDERS IN COUNCIL.

1. Miss M. Meehan appointed first female teacher, and Miss A. F. Laven and Miss E M. Hill appointed assistant teachers in the Provincial Model School, Toronto. (Approved 28th Sept., 1901)

2. Wm. Gregory, Serg't.-Major of the Seventh Battalion, appointed Drill Instructor at the London Normal School. (Approved 2nd Oct., 1901.)

III. MINUTES OF THE DEPARTMENT.

1 Junior Matriculation standing awarded to Mr. E. Lane Kenney, of Brockville. (Approved 1st March, 1901.)

2 Inspector's certificate granted to Mr. Neil McDougall, of Parkhill. (Approved 29th May, 1901.)

APPENDIX G.—*TECHNICAL EDUCATION—PUBLIC AND FREE LIBRARIES, ART SCHOOLS, LITERARY AND SCIENTIFIC INSTITUTIONS, Etc.*

Report of S P. May, M.D., C.L H., Superintendent of Public Libraries, Art Schools, Etc.

Sir,—I have the honor to submit herewith my report on the Public and Free Libraries, Art Schools, and Scientific Institutions receiving a share of the Government Grant, in the Province of Ontario :

In the year 1900 two important changes came into operation in the management of the Public Libraries of this Province.

1. The business year for Libraries was changed. It was formerly from the 1st May to the 30th April; now it is from the 1st of January to 31st December in each year. During the past half century Mechanics' Institutes and Public Libraries reported from the 1st May to the 30th April in each business year, so that the Annual Reports would contain full reports of Evening Classes which were then popular and kept open until 1st May in each year, but for various reasons Evening Classes in Public Libraries are now almost abolished, and the number of Free Libraries is gradually increasing (we now have 126 Free Libraries), and, as the Treasurers of Cities, Towns and Villages are usually appointed Treasurers of Public Libraries, it was considered that it would complicate their accounts if they had to make separate annual statements. This change is very much appreciated, except by a few persons who are accustomed to the old arrangements, and who prefer purchasing their books after the 31st December in each year.

2 In my tours of inspection I find that a number of Reading Rooms in rural districts were a source of expense which could not be met by many of the Library Boards, and this deprived them of a share of the Legislative Grant. On investigation I found that the newspapers in the Reading Rooms of many Libraries are seldom if ever read, because persons who want to keep up with the times prefer to pay for their own papers and not wait for a chance of reading them at the library. After consultation with the Minister it was decided that the grant be allowed for standard magazines the same as for books. This change is working admirably ; the magazines, which contain the current literature of the day, are circulated the same as books ; of course there will be a gradual decrease in the number of Reading Rooms, but that will eventually be of benefit to the Library, as readers who want to study new inventions, etc, will prefer taking the magazines to their homes to read instead of trying to concentrate their thoughts in a room full of people.

It is very gratifying to state, that there has been a great improvement and progress in the Public Libraries of the Province during the past year ; as my Report shows, the number of Libraries are largely increased, but what is of more importance is the fact that the people of our Province now realize the benefit they derive from the liberality of the

Legislature in providing books for the masses; during my inspection tours I was much impressed by the heartfelt thanks of uneducated men and women that their children after leaving school can now be educated at the expense of the state. Formerly many persons were adverse to the establishment of Public Libraries, but now the efforts of the Education Department in this direction is well appreciated. I visited about 100 Institutions this year, and only met one man who did not approve of Public Libraries because he thought they would give too much education to the people.

At the present time there are 448 Public and Free Libraries, Art Schools, Scientific Institutions, etc, receiving Government aid in operation in this Province.

For the year ending 31st December, 1900, the following institutions reported:

Public Libraries (not free)	263
Public Libraries (free)	126
Art Schools, etc.	7
Scientific Institutions, etc	9
New Libraries and others which did not report before 31st of December, 1901	43
Total	448

The following Public Libraries did not report: Athens, Bognor, Brougham, Calabogie, Courtright, Dawson, Drayton, Dufferin, Flesherton, Forks of the Credit, Gore Bay, Hastings, Horning's Mills, Inkerman, Kearney, King, Mono Centre, Mono College, (Orangeville P.O), Morewood, Pelee Island, Pembroke, Ripley, Tweed, Violet Hill, Webbwood.—25.

The following Libraries, being closed, have been taken off the official list of Public Libraries: Bath, Coboconk, St Vincent, Sturgeon Falls —4.

The following Public Libraries have been incorporated since 1st January, 1901: Avonmore, Badjeros, Bancroft, Bloomsburg, Brigden, Brucefield. Bruce Mines, Canfield, Delora, Dromore, Elmwood, Finch, Holstein, Middleville, Mount Bridges, Newington, Osprey (Feversham P.O.), Port Burwell.—18.

I inspected the following Public and Free Libraries, Art Schools, Literary and Scientific Institutions, etc., during the year:—Alma, Ayr, Aurora, Beamsville, Belleville, Bracebridge, Bradford, Bobcaygeon, Bothwell Bridgeburg, Brighton, Burk's Falls, Caistorville, Cambray, Coboconk, Cobourg, Colborne, Drumbo, Dunnville, Dutton, Emsdale, Elora, Exeter, Fenelon Falls, Fergus, Fonthill, Fort Erie, Freelton. Garden Island, Glencoe, Gravenhurst, Hamilton P. L., Hamilton Art School, Hamilton Scientific Association, Haliburton, Hensall, Highgate, Highland Creek, Holyrood, Huntsville, Kearney, Kincardine, Kinmont, Kemptville, Kingston P. L., Kingston Art School, Lindsay, London P. L, London Art School, London Art Department Normal School, Lucknow, Madoc, Markham, Manilla, Melancthon, Merritton, Millgrove, Napanee, Napanee Mills, Newburg, Newbury, Niagara, Niagara Falls, Niagara Falls S, Oakwood, Parry Sound, Pickering, Picton, Plattsville, Port Carling, Port Colborne, Powassan, Prescott, Queensville, Ripley, Rodney, Rosseau, Scotland, Shelburne, South River, Sprucedale, St. Thomas P. L, St Thomas Art School, Stouffville, Sundridge, Thorold, Unionville Wales, Waterdown, Waterford, Welland, West Lorne.

I also visited several Public Libraries, Art Schools, etc., in the United States. (See special report.)

The following table shows the locality of every Public Library in the Province.

PUBLIC LIBRARIES IN 1900 1901.

Counties and Districts.	Cities, Towns and Villages.
Addington	Camden, East.
"	Enterprise.
"	Napanee Mills.
"	Newburg.
"	Tamworth.
Algoma	Bruce Mines.
"	Chapleau.
"	Marksville.
"	Nairn Centre.
"	Ophir.
"	Port Arthur.
"	Rat Portage.
"	Sault Ste. Marie.
"	Schreiber.
"	Thessalon.
"	Webbwood.
Brant	Brantford.
"	Burford.
"	Glenmorris.
"	Paris.
"	Scotland.
"	St. George.
Bruce	Bervie.
"	Cargill.
"	Chesley.
"	Elmwood.
"	Hepworth.
"	Holyrood.
"	Kincardine.
"	Lion's Head.
"	Lucknow.
"	Mildmay.
"	Paisley.
"	Pinkerton.
"	Port Elgin.
"	Ripley.
"	Riversdale.
"	Southampton.
"	Teeswater.
"	Tara.
"	Tiverton.
"	Underwood.
"	Walkerton.
"	Westford.
"	Wiarton.
Carleton	Carp.
"	Dawson.
"	Kars.
"	Kinburn.
"	Manotick.
"	Metcalfe.
"	Munster.
"	North Gower.
"	Richmond.
Dufferin	Grand Valley.
"	Horning's Mills.
"	Melancthon.
"	Mono Centre.
"	MonoCollege(OrangevilleP.O.)
"	Orangeville.
"	Primrose.
"	Rosemont.
"	Shelburne.
"	Violet Hill.
Dundas	Chesterville.
"	Dundela.
"	Inkerman.
"	Iroquois.
	Morewood.
Dundas	Morrisburg.
"	Winchester.
Durham	Bowmanville.
"	Millbrook.
"	Orono.
"	Port Hope.
Elgin	Aylmer.
"	Bayham.
"	Dutton.
"	Port Burwell.
"	Port Stanley.
"	Rodney.
"	St. Thomas.
"	Shedden.
"	Sparta.
"	Springfield.
"	West Lorne.
Essex	Amherstburg.
"	Comber.
"	Essex.
"	Harrow.
"	Kingsville.
"	Leamington.
"	Pelee Island.
"	Windsor.
Frontenac	Garden Island.
"	Kingston.
"	Mississippi.
Glengarry	Lancaster.
"	Williamstown.
Grenville	Algonquin.
"	Cardinal.
"	Easton's Corners.
"	Kemptville.
"	Merrickville.
"	North Augusta.
"	Oxford Mills.
"	Prescott.
"	Spencerville.
Grey	Badjeros.
"	Bognor.
"	Chatsworth.
"	Clarksburg.
"	Dromore.
"	Durham.
"	Dundalk.
"	Flesherton.
"	Holland Centre.
"	Holstein.
"	Kemble.
"	Hanover.
"	Lake Charles.
"	Markdale.
"	Meaford.
"	Osprey (Feversham P.O.)
"	Owen Sound.
"	Shallow Lake.
"	Thornbury.
Haliburton	Haliburton.
"	Minden.
Haldimand	Caledonia.
"	Canfield.
"	Cayuga.
"	Cheapside.
"	Dufferin (Clanbrassil P.O.)
"	Dunnville.
"	Hagersville.
"	Jarvis.
Haliburton	Nanticoke.

Public Libraries.

Counties and Districts.	Cities, Towns and Villages.
Haliburton	Victoria.
"	York.
Halton	Acton.
"	Burlington.
"	Georgetown.
"	Milton.
"	Oakville.
Hastings	Bancroft.
"	Belleville
"	Delora.
"	Deseronto.
"	Madoc.
"	Trenton.
"	Tweed.
Huron	Auburn.
"	Brucefield.
"	Blyth.
"	Brussels.
"	Clinton.
"	Dungannon.
"	Ethel
"	Exeter.
"	Fordwich.
"	Goderich.
"	Gorrie.
"	Hensall.
"	Seaforth.
"	St. Helens.
"	Wingham.
"	Wroxeter.
Kent	Blenheim.
"	Bothwell.
"	Chatham.
"	Dresden.
"	Duart.
"	Highgate
"	Tilbury.
"	Tilbury E. (Valetta P.O.)
"	Ridgetown.
"	Romney.
"	Thamesville.
"	Wallaceburg.
"	Wheatley.
Lambton	Arkona.
"	Aberarder.
"	Alvinston.
"	Brigden.
"	Bunyan.
"	Coldeston.
"	Courtwright.
"	Forest.
"	Oil Springs.
"	Point Edward.
"	Sarnia.
"	Thedford.
"	Watford.
"	Wyoming.
Lanark	Allan's Mills.
"	Almonte.
"	Carleton Place.
"	Dalhousie (McDonald's P.O.).
"	Lanark.
"	Middleville.
"	Pakenham.
"	Perth.
"	Smith's Falls.
Leeds	Athens.
"	Brockville.
"	Gananoque.
"	Mallorytown.
Lennox	Odessa.
Lennox	Napanee.
Lincoln	Beamsville.
"	Caistorville.
"	Grantham(St.CatharinesP.O.)
"	Merritton.
"	Grimsby.
"	Niagara.
"	St. Catharines.
Manitoulin I.	Gore Bay.
"	Little Current.
"	Manitowaning.
Middlesex	Ailsa Craig.
"	Belmont.
"	Coldstream.
"	Dorchester.
"	Glencoe.
"	London.
"	Lucan.
"	Melbourne.
"	Mt Bridges.
"	Newbury.
"	Parkhill.
"	Strathroy.
"	Wardsville.
Muskoka	Bracebridge.
"	Gravenhurst.
"	Huntsville.
"	Port Carling.
Nipissing	Copper Cliff.
"	Haileybury.
"	North Bay.
"	Thornloe.
Norfolk	Bloomsburg.
"	Delhi.
"	Port Dover.
"	Port Rowan.
"	Simcoe.
"	Waterford.
Northumberland	Brighton.
"	Campbellford.
"	Cobourg.
"	Cold Springs.
"	Colborne.
"	Fenella.
"	Gore's Landing.
"	Warkworth.
Ontario	Beaverton.
"	Brooklin
"	Brougham.
"	Cannington.
"	Claremont.
"	Oshawa.
"	Pickering.
"	Port Perry.
"	Sunderland.
"	Uxbridge.
"	Whitby.
"	Zephyr.
Oxford	Drumbo.
"	Embro.
"	Harrington.
"	Ingersoll.
"	Kintore.
"	Plattsville.
"	Norwich
"	Otterville.
"	Princeton.
"	Tavistock.
"	Tilsonburg.
"	Thamesford.
"	Woodstock.

Public Libraries.

Counties and Districts.	Cities, Towns and Villages.
Parry Sound	Burk's Falls.
"	Emsdale.
"	Kearney.
"	Parry Sound.
"	Powassan.
"	Rosseau.
"	South River.
"	Sprucedale.
"	Sundridge.
"	Trout Creek.
Peel	Alton.
"	Belfountain.
"	Bolton.
"	Brampton.
"	Caledon.
"	Cheltenham.
"	Claude.
"	Forks of the Credit.
"	Inglewood.
"	Mono Road.
"	Mono Mills.
"	Port Credit.
"	Streetsville.
Perth	Atwood.
"	Listowel.
"	Milverton.
"	Monkton.
"	Mitchell.
"	Shakespeare.
"	St. Mary's.
"	Stratford.
Peterborough	Hastings.
"	Lakefield.
"	Norwood.
"	Peterborough.
Prescott	Vankleekhill.
Prince Edward	Bloomfield.
"	Picton.
Rainy River	Dryden.
"	Fort Francis.
Renfrew	Admaston.
"	Arnprior.
"	Burnstown.
"	Calabogie.
"	Cobden.
"	Douglas.
"	Pembroke.
"	Renfrew.
"	White Lake.
Russell	Russell.
"	Vars.
Stormont	Avonmore.
"	Cornwall.
"	Finch.
"	Newington.
"	Wales.
Simcoe	Alliston.
"	Angus.
"	Barrie.
"	Beeton.
"	Bradford.
"	Coldwater.
"	Collingwood.
"	Cookstown.
"	Creemore.
"	Elmvale.
"	Midland.
"	Orillia.
"	Penetanguishene.
"	Stayner.
"	Sunnidale (New Lowell P.O.)
Simcoe	Tottenham.
Victoria	Bobcaygeon.
"	Cambray.
"	Fenelon Falls.
"	Kinmount.
"	Kirkfield.
"	Little Britain.
"	Lindsay.
"	Manilla.
"	Oakwood.
"	Omemee.
"	Woodville.
Waterloo	Ayr.
"	Baden.
"	Berlin.
"	Elmira.
"	Floradale.
"	Galt.
"	Hawkesville.
"	Hespeler.
"	Linwood.
"	New Dundee.
"	New Hamburg.
"	Prescott.
"	Waterloo.
"	Wellesley.
Welland	Bridgeburg.
"	Fonthill.
"	Fort Erie.
"	Niagara Falls.
"	Niagara Falls South.
"	Port Colborne.
"	Ridgeway.
"	Thorold.
"	Welland.
Wellington	Alma.
"	Arthur.
"	Belwood.
"	Clifford.
"	Drayton.
"	Elora.
"	Erin.
"	Ennotville.
"	Fergus.
"	Glen Allen.
"	Guelph.
"	Harriston,
"	Hillsburg.
"	Morriston.
"	Mount Forest.
"	Palmerston.
"	Rockwood.
Wentworth	Ancaster.
"	Binbrook.
"	Dundas.
"	Freelton.
"	Hamilton.
"	Mill Grove.
"	Lynden
"	Waterdown.
York	Aurora.
"	Bracondale.
"	Don.
"	Highland Creek.
"	Islington.
"	King.
"	Maple.
"	Markham,
"	Mount Albert.
"	Newmarket.
"	Queensville.

PUBLIC LIBRARIES.

Counties and Districts.	Cities, Towns and Villages.	Counties and Districts.	Cities, Towns and Villages.
York	Richmond Hill.	York	Toronto Junction.
"	Scarborough.	"	Unionville
"	Stouffville.	"	Vandorf
"	Thornhill.	"	Weston
"	Toronto.	"	Woodbridge

The above list may be classified as follows.

Public Libraries reporting	263	Public Libraries incorporated since 31st December, 1900	18
Free Libraries reporting	126		
Public Libraries not reporting	22	Total	432
Free Libraries not reporting	3		

I. PUBLIC LIBRARIES (NOT FREE).

The following extracts are taken from the annual reports for the year ending 31st December, 1900 (For details see tables A and B):

1. *Classification of Public Libraries Reporting.*

Public Libraries, with libraries, reading rooms, and evening classes		1
" " and reading rooms		108
" " only		154
Total		263

2. *Public Libraries—Receipts and Balances on hand.*

The total receipts of Public Libraries was	$83,800 63
Balances on hand	4,649 85

3. *Public Libraries—Expenditure.*

The total expenditure of 263 Public Libraries was $79,150 78

4. *Public Libraries—Assets and Liabilities*

Assets of 263 Public Libraries	$381,543 59
Liabilities of 263 Public Libraries	20,491 58

5. *Number of Members in Public Libraries.*

263 Public Libraries have 35,329 members.

6. *Number of Volumes in Public Libraries and number of Volumes issued.*

Number of volumes in 263 Libraries	478,996
Number of volumes issued in 263 Libraries	724,261

7. *Reading Rooms in Public Libraries.*

108 Libraries reporting have reading rooms.
14 Libraries reported having periodicals for circulation.
122 Libraries subscribed for 2,518 newspapers and periodicals.

8. *Evening Classes in Public Libraries.*

Two Libraries had 35 pupils in the drawing courses.

TABLE A.—Receipts, Expenditure, Assets and Liabilities, etc. of Public Libraries (not Free) for the year ending 30th April, 1900.

Public Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	No. of volumes in Libraries.	No. of volumes issued.	No. of newspapers & periodicals	Assets.	Liabilities.
	$ c.	$ c.	$ c.					$ c.	$ c.
1 Aberarder	455 67	388 42	67 25	108	3,194	2,561	26	1,716 00	150 00
2 Adamston	103 57	94 13	9 44	167	1,125	1,450	....	557 00	....
3 Alma	158 18	157 76	42	112	721	565	....	459 67	30 00
4 Allan's Mills	53 60	45 81	7 79	105	473	494	...	300 00	.....
5 Allston	141 60	133 64	7 96	120	1,814	2,752	.	1,367 21	8 64
6 Almonte	562 90	457 40	105 50	135	3,177	5,615	23	3,338 00	22 00
7 Amherstburg	165 93	165 93	.....	110	2,467	2,909	12	3,050 00	147 62
8 Ancaster	382 12	380 55	1 57	132	484	2,119	.. .	357 00	150 00
9 Angus	68 61	59 65	8 96	109	400	479	....	188 86	.....
10 Arkona	456 37	453 59	2 78	102	2,154	2,957	20	1,300 00	190 00
11 Arthur	224 54	224 35	19	100	2,683	1,455	19	1,750 00	134 00
12 Atwood	436 52	421 53	14 99	112	1,252	5,066	.	1,001 41	173 43
13 Auburn	572 65	572 65	.....	114	982	2,834	12	680 20	170 76
14 Aurora	540 87	515 11	25 76	141	2,756	7,349	...	3,753 76	1,009 00
15 Baden	242 18	242 18	.....	113	2,676	1,042	17	1,459 53	52 25
16 Barrie	982 40	975 90	6 50	364	4,463	9,228	28	4,929 50	275 00
17 Bayham	133 68	90 93	42 75	108	525	442	....	373 81	.....
18 Beamsville	332 60	323 16	9 44	168	2,002	3,728	5	2,056 13	..
19 Beaverton	424 47	398 68	25 79	115	1,227	2,334	23	1,028 89	105 68
20 Belleville	2,312 09	2,309 92	2 17	151	4,164	7,340	32	3,600 00	95 85
21 Belmont	55 24	49 87	5 37	104	1,150	1,121	...	843 65	1 74
22 Belwood	238 38	236 60	1 78	104	1,083	1,944	....	905 06	30 00
23 Bervie	267 09	240 27	26 82	110	926	422	....	536 82	175 82
24 Binbrook	254 80	217 85	36 95	111	514	1,114	....	292 52	120 24
25 Blenheim	543 22	527 52	15 70	178	3,269	5,783	22	2,755 00	160 00
26 Bloomfield	298 45	270 46	27 99	148	1,455	5,858	25	1,109 64	45 00
27 Blyth	110 92	96 50	14 42	102	1,381	1,190	...	696 33	.....
28 Bobcaygeon	337 87	249 99	87 88	100	2,199	2,295	21	1,798 73	.....
29 Bolton	258 92	258 92	.....	160	2,613	4,800	18	1,350 00	8 77
30 Bowmanville	675 38	668 16	7 22	151	3,129	4,690	43	3,268 00	100 08
31 Bracebridge	285 76	283 18	2 58	129	2,437	4,177	22	2,500 00	18 75
32 Bracondale	274 75	252 22	22 53	112	861	1,594	2	575 00	100 00
33 Bradford	172 27	171 85	42	142	2,072	1,608	....	1,490 94	78 25
34 Bridgeburg	272 08	272 08	.....	101	748	3,011	....	458 97	29 33
35 Brooklin	326 31	318 02	8 29	147	1,561	2,998	4	800 00	50 00
36 Bunyan	75 53	65 72	9 81	113	140	306	..	66 85	.....
37 Burford	323 80	307 11	16 69	111	1,460	2,630	18	1,067 46	76 65
38 Burlington	365 02	331 45	33 57	103	1,943	3,699	9	1,529 78	110 00
39 Burnstown	88 67	81 89	6 78	75	673	795	....	310 00	....
40 Caistorville	175 92	175 92	.....	125	221	850	...	167 42	148 29
41 Cambray	165 20	164 86	34	126	570	1,323	....	445 00	....
42 Campbellford	425 49	417 29	8 20	175	3,822	3,730	21	2,033 20	134 93
43 Cannington	276 36	276 36	.....	105	2,069	2,843	21	1,700 93	57
44 Cargill	558 33	488 86	69 47	106	1,208	1,909	....	861 37	.....
45 Carp	190 34	156 57	33 77	101	994	1,725	....	707 00	.....
46 Chapleau	358 85	357 78	1 07	105	1,585	1,402	28	2,513 91	139 48
47 Chatsworth	135 90	135 90	.....	102	2,365	3,794	10	1,633 00	8 25
48 Cheapside	102 08	90 90	11 18	118	1,271	1,325	....	852 69	....
49 Cheltenham	132 88	100 00	32 88	103	2,270	1,543	....	1,901 92	100 00
50 Claremont	187 84	187 84	.....	104	1,980	1,479	....	1,404 14	11 46
51 Clarksburg	83 42	61 21	22 21	157	970	1,382	....	937 84	.....
52 Claude	146 19	116 51	29 68	104	2,572	2,037	...	1,800 00	....
53 Cobden	199 61	199 61	....	130	271	1,374	....	184 08	85 38
54 Cobourg	1,010 19	1,008 20	1 99	213	3,251	10,901	31	1,650 00	131 00
55 Colborne	214 41	211 59	2 82	130	1,515	1,560	15	925 00	138 74
56 Cold Springs	340 75	337 05	3 70	120	1,181	1,039	...	1,012 15	150 00
57 Coldstream	276 04	267 86	8 18	101	1,314	2,398	22	726 05	100 00
58 Coldwater	492 15	475 70	16 45	150	1,335	3,146	21	877 60	220 63
59 Comber	357 73	337 11	20 62	100	1,504	2,655	16	820 00	.....
60 Cookstown	141 55	141 55	.....	114	1,083	10,471	....	598 15	114 15
61 Copper Cliff	130 17	93 03	37 14	105	1,171	788	....	930 32	....
62 Dalhousie (McDonald's Cor's)	69 54	66 21	3 33	114	417	870	2	260 00	.....
63 Dorchester	192 65	174 91	17 74	116	819	1,075	....	495 48	.....
64 Douglas	120 25	112 40	7 85	117	811	1,176	....	498 10	..
65 Dresden	361 36	351 66	9 70	104	1,295	3,792	....	894 68	142 79
66 Drumbo	232 05	215 78	16 27	103	303	1,085	....	211 89	40 00
67 Dryden	235 21	224 29	10 92	101	668	1,372	10	396 17	145 47

TABLE A.—Receipts, Expenditure, Assets and Liabilities, etc. of Public Libraries (not Free) for the year ending 30th April, 1900—*Continued.*

Public Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	No. of volumes in Library.	No. of volumes issued.	No. of newspapers & periodicals	Assets	Liabilities
	$ c.	$ c.	$ c.					$ c.	$ c.
68 Duart	280 42	245 43	34 99	101	2,335	1,928	...	1,580 61	85 32
69 Dundalk	172 46	167 80	4 66	157	2.461	2,268	5	1,600 00	....
70 Dundas	851 39	825 31	26 08	210	7,035	5,033	38	5,750 00	....
71 Dundela	34 84	34 09	75	112	246	463	...	66 59	24 16
72 Dungannon	227 08	187 33	39 75	107	1,466	1,800	15	789 83	92 33
73 Dunnville	224 66	212 27	12 39	104	3,152	5,898	2	1,112 39	....
74 Durham	311 64	256 79	54 85	126	3,968	3,328	23	4,004 85	....
75 Easton's Corners	170 94	135 46	35 48	101	940	741	....	681 02	....
76 Elmira	284 36	284 16	20	123	2,703	1,302	17	1,878 05	128 87
77 Elmvale	447 46	439 87	7 59	103	1,224	1,665	17	610 23	250 00
78 Elora	475 60	475 60	....	153	8,880	6,460	20	8,250 00	78 07
79 Embro	306 51	276 27	30 24	103	4,720	4,434	14	3,876 89	50 59
80 Emsdale	135 25	125 03	10 22	109	582	273	....	440 00	97 95
81 Ennotville	233 37	173 61	59 76	250	2,616	806	....	2,100 00	.....
82 Essex	507 14	507 14	.... ..	104	2,424	2,604	24	2,215 61	134 53
83 Ethel	176 73	130 13	46 60	148	1,329	1,703	.. .	875 26	130 00
84 Fenella	79 30	48 73	30 57	105	524	184	....	202 70	.....
85 Fenelon Falls	360 02	352 30	7 72	134	3,209	3,720	32	2,419 93	117 62
86 Fergus	348 23	339 69	8 54	300	4.601	3,785	17	5,670 05	.....
87 Floradale	150 31	140 11	10 20	149	1,894	1,723	....	922 97	....
88 Fonthill	314 25	306 13	8 12	104	2,508	2,431	19	2,279 50	135 00
89 Fort Erie	209 58	193 96	15 62	108	2,505	1,886	....	1,584 11	7 00
90 Fort Francis	420 60	420 60	..	103	625	1.809	25	655 00	46 05
91 Freelton	105 00	102 80	2 20	105	111	272	....	100 92	.....
92 Gananoque	536 02	536 02	.....	156	2,792	9,627	21	2,116 91	138 08
93 Glen Allen	104 43	103 11	1 32	105	802	1,058	....	537 12	.....
94 Glenmorris	213 05	209 01	4 04	100	2,159	1,442	16	1,684 45	.....
95 Gore's Landing	298 67	291 24	7 43	112	607	1 011	....	572 01	121 53
96 Gorrie	131 31	131 31	.....	174	1,808	2,830	...	1,399 90	.....
97 Haileybury	54 47	45 52	8 95	117	170	323	....	82 51	.....
98 Haliburton	129 40	129 27	13	108	363	450	. ..	158 13	14 64
99 Harrington	219 54	201 65	17 89	61	693	854	. ..	450 00	.....
100 Harrow	283 72	264 19	19 53	175	864	1,525	....	484 03	....
101 Hawkesville	212 95	205 79	7 16	122	734	1,977	....	329 41	78 91
102 Hensall	738 03	684 68	53 35	125	769	1 047	....	533 86	... . .
103 Hepworth	151 31	151 09	22	124	885	1,830	14	511 12	.....
104 Hespeler	489 07	277 51	211 56	134	2,955	3,686	22	2,576 56	.. ....
105 Highgate	226 94	226 75	19	103	1,109	4,191	....	820 00	127 06
106 Highland Creek	95 30	95 00	30	105	1,568	1,654	.	1,226 64	... .
107 Hillsburg	280 00	250 00	30 00	108	719	1,385	....	465 00	200 00
108 Holland Centre	77 88	77 36	52	105	821	434	....	524 40	.....
109 Holyrood	231 30	223 42	7 88	105	1,821	3,708	....	1,661 55	83 34
110 Huntsville	483 18	477 88	5 30	101	2,350	7,339	21	1,560 00	90 00
111 Inglewood	103 77	99 25	4 52	114	1,659	1,342	...	1,294 79	37 50
112 Islington	101 97	101 96	01	141	1,308	1,332	8	610 00	....
113 Jarvis	356 51	344 36	12 15	106	3,112	3,876	18	1,172 15	194 01
114 Kars	157 51	145 76	11 75	105	1,506	1,293	....	950 00	.....
115 Kemble	269 54	262 93	6 61	109	518	1,379	4	253 13	200 00
116 Kinburn	137 51	134 51	3 00	118	1,233	1,258	....	752 87	28 50
117 Kincardine	392 10	392 10	.... ..	192	4,226	7,032	25	3,735 00	350 88
118 Kingston	929 30	925 43	3 87	298	6,627	19,084	58	6,350 00	367 02
119 Kinmount	343 82	337 44	6 38	111	1,098	2,176	....	895 27	112 60
120 Kintore	40 75	29 40	11 35	146	684	1,023	....	476 04	40 00
121 Kirkfield	207 48	198 97	8 51	102	1,502	980	16	650 91	132 50
122 Lake Charles	131 31	129 63	1 68	102	1,751	2,637	....	1,218 93	....
123 Linwood	162 12	162 12	....	115	673	597	....	456 53	40 21
124 Lion's Head	83 70	79 99	3 71	151	1,230	621	....	209 74	.....
125 Little Britain	329 08	306 09	22 99	155	1,540	1,723	25	1,279 48	62 43
126 Lucan	192 54	173 85	18 69	140	2,118	6,810	....	1,893 00	.....
127 Lynden	235 50	225 83	9 67	112	1,251	2,503	5	681 56	75 00
128 Madoc	261 35	261 35	.....	164	397	146	....	260 60	55 35
129 Mallorytown	299 06	281 31	17 75	107	1,206	1,080	....	732 50	199 99
130 Manilla	247 94	219 14	28 80	114	1,9 6	2,128	....	1,291 58	....
131 Manitowaning	282 74	270 08	12 66	235	929	737	....	598 98	209 78
132 Manotick	137 57	132 56	5 01	105	1,558	2,377	....	1,101 07	.....
133 Maple	65 17	63 90	1 27	108	514	1,111	....	361 45	.....
134 Markdale	329 54	309 76	19 78	152	2,404	2,786	17	2,156 13	35 00
135 Markham	198 36	198 36	.....	107	2,857	4.137	....	2,005 00	39 19

TABLE A.—Receipts, Expenditure, Assets and Liabilities, etc. of Public Libraries (not Free) for the year ending 30th April, 1900.—*Continued*

Public Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	No. of volumes in Libraries.	No. of volumes issued.	No. of newspapers & periodicals	Assets.	Liabilities.
	$ c.	$ c.	c.					$ c.	$ c.
136 Marksville	165 71	153 84	11 87	102	293	1,094	..	188 44	50 00
137 Meaford	417 61	417 28	33	157	2,481	1,257	19	2,785 00	.....
138 Melancthon	141 64	141 64	....	100	707	1,182	....	358 94	61 85
139 Melbourne	105 87	97 17	8 70	105	801	916	....	485 00	22 25
140 Metcalfe	283 92	283 92	.....	114	141	165	....	149 17	12 42
141 Mildmay	373 33	328 82	44 51	111	1,325	1,816	....	753 56	142 33
142 Milton	173 85	173 85	.....	160	5,138	5,775	24	4,100 00	18 23
143 Minden	172 70	154 99	17 71	101	651	1,052	....	596 68	18 00
144 Mississippi	160 05	149 59	10 46	105	557	777	....	345 24	146 35
145 Moulton	434 42	429 43	4 99	112	970	1,964	....	654 40	200 00
146 Mono Mills	34 53	2 00	32 53	7	501	.....	....	255 59	.....
147 Mono Road	70 36	70 36	.....	105	1,784	3,238	....	910 00	50 00
148 Morrisburgh	378 80	378 80	.....	123	2,256	3,456	24	1,275 00	75 00
149 Morriston	113 10	64 49	48 61	101	1,055	1,416	3	619 24	.....
150 Mount Albert	145 00	118 28	26 72	101	617	1,215	....	408 06	56 11
151 Mount Forest	362 42	335 63	26 79	120	3,089	3,913	37	2,726 79	.....
152 Munster	81 35	70 50	10 85	115	161	160	....	76 28	.....
153 Nanticoke	213 05	212 39	66	168	1,622	1,841	....	1,069 64	100 00
154 Napanee	537 67	511 46	26 21	230	3593	7,008	37	1,300 00	269 50
155 Newburgh	221 83	209 29	12 54	103	1,852	1,416	23	1,360 13	145 44
156 Newbury	171 17	163 28	7 89	150	275	234	....	162 41	129 27
157 New Dundee	253 75	223 59	30 16	104	425	770	....	206 00	150 60
158 New Hamburgh	381 94	359 76	22 18	113	2,243	2,225	17	1,500 00	190 17
159 Newmarket	359 60	255 44	104 16	136	1,983	3,727	....	1,614 05	107 80
160 Niagara	320 16	320 16	.....	104	5,020	5,935	25	4,850 00	.....
161 Niagara Falls	702 84	677 00	25 84	300	5,295	7,910	24	6,500 00	.....
162 North Gower	118 43	112 76	5 67	110	1,371	1,547	....	870 00	.....
163 Norwich	780 14	732 88	47 26	114	1,113	3,032	16	740 00	.....
164 Norwood	337 80	332 97	4 83	156	1,933	4,313	16	985 00	168 90
165 Oakville	258 44	257 57	87	132	3,196	3,196	..	2,720 00	40 66
166 Oakwood	514 64	498 48	16 16	110	1,120	2,041	21	755 71	238 87
167 Odessa	266 78	264 81	1 97	156	706	1,805	15	423 04	95 04
168 Omemee	300 49	299 68	81	123	1,075	2,394	22	894 26	96 96
169 Ophir	126 35	96 95	29 40	117	863	31	..	130 20	75 00
170 Orangeville	781 13	719 62	61 51	190	3,128	3,305	29	3,181 75	250 00
171 Orillia	889 00	883 23	5 77	187	3,835	6,384	22	3,768 30	315 00
172 Orono	153 60	153 49	11	93	1,211	1,630	....	1,058 76	14 81
173 Owen Sound	447 37	447 37	.....	239	4,637	10,694	24	5,000 00	.....
174 Oxford Mills	80 56	79 96	60	93	1,120	4,257	....	904 43	.....
175 Pakenham	114 37	111 55	3 32	120	479	927	....	347 12	47 74
176 Palmerston	421 85	421 85	.....	264	1,694	5,314	26	1,050 00	350 00
177 Paris	641 52	641 52	.....	155	6,777	6,766	36	11,245 11	22 70
178 Perth	364 34	355 59	8 75	179	4,036	5,157	14	1,908 75	177 07
179 Peterborough	1,276 18	1,180 19	95 99	387	9,260	15,003	81	10,900 61	60 00
180 Pickering	198 36	135 21	63 15	113	1,589	2,155	....	1,050 00	.....
181 Picton	545 94	542 83	3 11	210	2,888	6,841	20	1,335 00	60 00
182 Pinkerton	377 11	375 58	1 73	100	966	2,046	....	581 37	132 00
183 Plattsville	132 67	87 30	45 37	100	813	1,070	....	520 76	.....
184 Point Edward	376 37	256 38	119 99	146	2,988	2,738	....	3,344 10	.....
185 Port Arthur	994 97	967 67	27 30	130	1,719	3,308	21	1,949 80	342 81
186 Port Credit	188 83	175 68	13 15	101	1,311	1,322	....	759 59	25 00
187 Port Dover	225 33	225 33	.....	100	380	73	10	252 06	155 00
188 Port Elgin	159 01	158 06	95	105	3,123	3,560	17	1,713 29	....
189 Port Hope	689 54	623 35	66 19	164	4,658	2,260	30	4,069 43	510 24
190 Port Perry	460 40	450 84	9 56	125	1,717	4,113	23	1,350 00	83 76
191 Port Stanley	186 80	186 31	49	119	992	2,248	1	826 70	.....
192 Powassan	220 65	219 05	1 60	117	417	1,031	....	203 85	97 00
193 Preston	458 95	450 66	8 29	150	5,732	3,958	28	6,009 29	.....
194 Princeton	347 41	346 72	69	104	1,160	3,136	....	630 87	82 93
195 Queensville	121 65	119 45	2 20	125	1,836	1,986	....	1,145 27	55 00
196 Rat Portage	1,200 20	1,191 59	8 61	115	1,847	4,315	26	1,542 60	470 00
197 Richmond	164 23	154 60	9 63	102	1,115	1,813	.	750 88	.....
198 Ridgetown	421 87	421 87	.....	203	3,262	3,328	17	4,355 49	31 25
199 Riversdale	90 82	63 58	27 24	117	761	496	....	438 06	.....
200 Rockwood	183 72	175 82	790	112	1,105	2,077	13	470 27	.....
201 Rodney	290 31	267 95	22 36	201	776	1,512	16	710 63	156 74
202 Romney	253 56	229 69	23 87	105	1,948	1,488	5	1,472 95	10 25
203 Rosemont	422 71	417 71	5 00	107	934	1,331	....	640 19	200 29

TABLE A.—Receipts, Expenditure, Assets and Liabilities, etc. of Public Libraries (not Free) for the year ending 30th April, 1900.—*Concluded.*

Public Libraries.	Receipts.	Expenditure.	Balance on hand.	Number of members.	No. of volumes in Libraries.	No. of volumes issued.	No. of newspapers & periodicals	Assets.	Liabilities.
	$ c.	$ c.	$ c.					$ c.	$ c.
204 Rosseau	262 35	236 88	25 47	104	419	543	....	200 00	200 00
205 Russell	339 49	322 22	17 27	152	1,337	3,941	23	1,927 61	99 14
206 Sarnia	3,459 99	3,265 63	194 36	1,191	2,866	18,312	47	2,812 40	....
207 Scarboro'	291 47	250 27	41 20	110	4,860	3,180	..	3,575 00	....
208 Schreiber	1,026 30	1,001 00	25 30	149	1,346	2,874	12	1,573 20	201 52
209 Scotland	281 85	268 00	13 85	122	906	3,329	26	595 27	....
210 Shakespeare	455 08	410 73	44 35	114	994	2,849	.	600 51	100 00
211 Shallow Lake	73 40	72 22	1 18	114	714	565	....	328 87	.....
212 Shedden	198 64	186 77	11 87	105	1,002	1,830	....	538 87	135 00
213 Southampton	231 74	131 94	99 80	119	3,860	2,900	3	3,069 06	.....
214 South River	234 23	225 34	8 89	107	650	1,360	....	859 73	....
215 Sparta	238 55	199 36	39 19	118	2,115	2,587	....	1,602 34	20 78
216 Spencerville	100 00	90 98	9 02	102	386	1,123	....	300 00	35 00
217 Sprucedale	229 50	229 50	...	110	351	76	....	210 90	204 50
218 Strathroy	819 56	732 98	86 58	268	5,352	13,180	26	5,050 00	19 83
219 Streetsville	511 23	511 23	.....	102	2,605	1,783	18	2,750 00	284 15
220 St. George	428 26	427 41	85	113	4,671	4,089	13	5,011 67	.....
221 St. Helen's	202 17	193 85	8 32	105	1,393	1,553	20	1,160 00	65 00
222 Sunderland	331 25	254 09	77 16	105	1,485	1,099	22	1,029 75	.....
223 Sunnidale (New Lowell)	166 78	166 78	....	124	285	1,464	....	163 80	6 00
224 Tavistock	481 33	428 56	52 77	105	2,703	3,332	26	1,533 52	...
225 Teeswater	359 19	301 28	57 91	133	3,331	2,267	22	2,200 00	....
226 Thamesford	200 62	200 62	....	119	1,644	3,136	13	1,186 92	16 07
227 Thamesville	673 97	672 06	1 91	201	3,162	6,046	14	2,689 87	330 00
228 Thedford	256 94	227 73	29 21	104	1,589	4,543	....	915 00	....
229 Thornbury	99 29	93 05	6 24	149	710	1,851	..	380 00	16 00
230 Thornhill	158 09	158 09	... ...	105	638	597	11	418 56	50 98
231 Thornloe	64 11	63 37	74	111	238	387	....	133 37	.....
232 Tilbury	459 89	459 89	.....	109	1,633	1,534	22	1,142 99	168 12
233 Tilbury E (Valetta P.O.)	127 37	103 30	24 07	100	1,590	934	.	500 00	.....
234 Tilsonburg	603 23	586 03	17 20	200	2,385	5,882	17	1,700 00	150 00
235 Tiverton	205 78	202 63	3 15	100	1,660	2,911	...	875 00	77 96
236 Toronto Junction	868 14	815 50	52 64	139	2,984	4,141	29	2,350 00	133 10
237 Trout Creek	168 87	168 87	....	105	853	1,852	....	572 96	155 79
238 Underwood	172 99	166 53	6 46	124	2,183	2,436	...	970 00	20 00
239 Unionville	125 78	125 16	62	50	463	1,356	....	275 00	....
240 Vandorf	191 93	175 57	16 36	102	2,060	774	....	1,600 00	92 50
241 Vankleek Hill	248 53	225 45	23 08	154	548	4,655	9	432 35	....
242 Vars	261 30	242 30	19 00	106	643	586	....	421 55	.....
243 Victoria (Caledonia P.O.)	144 28	134 71	9 57	118	2,068	1,390	...	1,435 94	.....
244 Wales	215 53	215 53	.....	105	428	210	....	204 53	93 00
245 Walkerton	298 84	292 61	6 23	114	2,485	3,282	18	1,914 15	47 72
246 Wardsville	98 00	97 45	55	110	1,298	1,263	....	850 57	67 80
247 Warkworth	266 67	266 67	.....	100	979	746	21	628 62	228 85
248 Waterdown	149 25	147 91	1 34	132	1,835	1,170	...	733 34	27 00
249 Welland	498 03	406 55	91 48	210	3,395	5,737	27	4,133 24	..... —
250 Wellesley	244 63	222 37	22 26	256	735	3,415	....	437 42	....
251 West Lorne	176 70	176 43	27	244	954	1,443	7	725 00	100 00
252 Weston	379 14	374 56	4 58	111	2,996	4,674	27	2,350 00	104 79
253 Wheatley	195 00	173 00	22 00	112	1,594	820	...	850 00	35 00
254 White Lake	74 60	71 55	3 05	126	538	1,000	....	252 25	.....
255 Whitby	384 83	375 30	9 53	145	2,864	4,760	....	1,850 00	115 87
256 Williamstown	170 79	170 24	55	126	982	1,070	....	1,070 81	57 03
257 Winchester	214 03	214 03	.....	101	874	1,124	....	596 70	26 51
258 Wingham	589 62	580 12	9 50	112	3,163	3,674	47	2,140 00	.....
259 Woodbridge	260 70	155 03	105 67	199	1,655	1,628	14	1,721 67	267 00
260 Woodstock	706 63	652 62	54 01	302	5,385	12,176	36	3,700 00	179 54
261 Woodville	272 25	267 55	4 70	102	2,127	2,092	29	1,375 00	.... ..
262 York	223 34	223 34	.....	100	734	1,721	....	429 48	13 64
263 Zephyr	249 59	248 19	1 40	107	815	1,594	....	527 11	195 68
Total	83,800 63	79,150 78	4,649 85	35,329	478,996	724,261	2,518	381,543 59	20,491 58

II. PUBLIC LIBRARIES, FREE.

The following extracts are taken from the Annual Reports for the year ending 31st December, 1900, (for details see table B).

1. *Classification of Free Libraries Reporting.*

Free Libraries, with libraries, reading rooms, and evening classes	1
" " " " and reading rooms	78
" " " " only	47
Total	126

2. *Free Libraries Receipts and Balances on hand.*

The total receipts of 126 Free Libraries was	$126,834 86
Balances on hand	9,529 52

3. *Free Libraries Expenditure.*

The total expenditure of 126 Free Libraries was	117,305 34

4. *Free Libraries Assets and Liabilities.*

Assets of 126 Free Libraries	642,756 55
Liabilities "	113,451 74

5. *Number of Readers in Free Libraries.*

126 Free Libraries report having had 111,879 readers.

6. *Number of Volumes in Free Libraries, and Number of Volumes Issued.*

Number of volumes in 126 Free Libraries	510,054
Number of volumes issued "	1,810,450

7. *Reading Rooms in Free Libraries.*

83 Free Libraries subscribed for 3,453 newspapers and periodicals.

TABLE B—Receipts and Expenditure, Assets and Liabilities of Free Libraries for the year ending 30th April, 1901.

Free Libraries.	Receipts.	Expenditures.	Balance on hand.	Number of members.	Number of volumes in library.	Number of volumes issued.	No. of newspapers and periodicals.	Assets.	Liabilities.
	$ c.	$ c.	$ c.					$ c.	$ c.
1 Acton	271 71	258 66	13 05	198	1,510	3,162		1,563 89	200 00
2 Ailsa Craig	270 81	179 94	90 87	112	2,001	1,755		1,841 27	47 08
3 Algonquin	101 92	98 50	3 42	125	1,267	1,202		762 25	
4 Alton	266 80	244 00	22 80	188	4,996	2,688		4,209 23	
5 Alvinston	421 30	397 30	24 00	220	1,304	2,450	17	900 00	225 00
6 Arnprior	421 12	419 09	2 03	352	2,132	4,403		1,282 03	95 17
7 Aylmer	443 44	443 44		391	3,639	7,288	26	3,200 00	2 20
8 Ayr	300 22	276 78	23 44	399	3,139	5,900	31	1,625 00	
9 Beeton	325 94	325 56	38	117	2,377	1,976	13	1,300 40	129 71
10 Belfountain	113 49	113 49		150	1,891	1,719		1,200 00	
11 Berlin	1,822 82	1,822 82		868	7,086	16,496	54	6,960 79	
12 Bothwell	530 81	438 18	92 63	400	1,655	3,862		1,186 87	200 24
13 Brampton	825 45	590 64	234 81	795	3,664	10,659	19	2,120 00	
14 Brantford	3,420 85	2,672 13	748 72	2,345	16,938	66,715	67	14,250 00	
15 Brighton	319 05	319 05		304	2,425	3,571	17	1,242 80	167 16
16 Brockville	2,077 01	1,868 33	208 68	2,234	8,808	40,727	49	4,600 00	
17 Brussels	415 30	409 33	5 97	145	2,381	4 428	28	1,226 00	
18 Burk's Falls	601 84	591 65	10 19	304	1,525	2,907	23	1,035 00	
19 Caledon	203 23	203 23		109	2,728	1,896		2,118 10	84 43
20 Caledonia	261 56	226 00	35 56	152	2,163	3,379		1,000 00	
21 Camden East	175 55	175 55		229	1,396	2,444	18	765 82	26 54
22 Cardinal	330 48	330 48		153	4,570	2,509	33	1,235 00	200 10
23 Carleton Place	610 76	487 86	122,90	400	3,688	14,264	16	2,540 00	1 50
24 Cayuga	293 74	284 62	9 12	110	1,444	3,168		860 00	199 68
25 Chatham	1,667 45	1.409 97	257 48	800	6,553	20,329	38	5,077 48	
26 Chesley	431 01	327 67	103 34	308	1,567	5,832	21	858 34	
27 Chesterville	214 59	204 11	10 48	220	925	2,554		660 71	
28 Clifford	357 80	357 85		151	3,189	1,958		1,461 54	153 41
29 Clinton	839 63	738 32	101 31	483	3,526	10,082	28	12,640 00	
30 Collingwood	1,024 57	963 60	60 97	634	4,781	11,104	37	5,100 76	105 75
31 Copleston	130 15	118 15	12 00	131	739	1,825		425 00	
32 Cornwall	835 07	796 21	38 86	641	3,091	12,888	37	2,149 71	722 15
33 Creemore	122 86	99 38	23 48	165	979	2,068		457 13	
34 Deseronto	1,424 64	1,322 84	111 80	800	2,931	35,754	63	3,092 33	385 00
35 Delhi	480 24	433 59	46 65	230	1,471	3,403	20	1,009 27	
36 Don	154 77	150 75	4 02	101	777	872	2	561 21	25 00
37 Dutton	290 70	281 15	9 55	302	1,293	3,953		934 07	187 92
38 Enterprise	61 17	59 60	1 57	150	761	1,067		401 42	
39 Erin	152 51	138 20	14 31	178	1,732	2,776		1,194 66	
40 Exeter	607 66	605 13	2 53	453	3,999	9,461	19	2,370 00	20 00
41 Fordwich	125 25	113 29	11 96	61	1,612	1,762		900 00	10 00
42 Forest	485 26	445 07	40 19	400	3,129	7,676	27	2,992 15	200 00
43 Galt	1,397 80	1,396 54	1 36	1,191	4,241	21,108	42	5,500 00	
44 Garden Island	890 91	688 85	202 06	118	5,256	1,161	28	2,991 00	
45 Georgetown	402 49	360 79	41 70	425	2,648	6,929	28	2,080 00	50 00
46 Glencoe	279 58	279 58		288	1,954	4,010		1,037 10	10 95
47 Goderich	526 50	457 81	68 69	600	3,814	14,090	26	1,350 00	62 70
48 Grand Valley	303 60	286 28	17 32	197	2,245	2,555	15	1,135 00	138 71
49 Grantham (St. Catharines)	355 04	342 82	12 22	197	1,458	2,060		915 00	50 00
50 Gravenhurst	191 22	179 25	11 97	268	2,122	12,930		1,058 62	
51 Grimsby	506 90	506 90		873	4,018	14,272	21		55 72
52 Guelph	1,722 22	1,722 22		1,210	10,418	59,666	45	10,700 00	
53 Hagersville	554 10	533 01	21 09	700	1,758	6,549	24	1,191 55	252 15
54 Hamilton	14,548 58	14,515 74	32 84	11,121	28,578	201,784	254	70,343 00	28,340 00
55 Hanover	217 05	216 55	50	215	593	3,314		431 52	157 83
56 Harriston	350 33	257 62	92 71	367	4,007	4,873	27	2,493 61	370 65
57 Ingersoll	831 72	817 46	14 26	750	3,758	19,983	25	2.100 00	
58 Iroquois	324 85	295 59	29 26	298	1,778	3,945	22	1,756 64	
59 Kemptville	388 49	273 59	109 90	103	917	420		671 54	243 49
60 Kingsville	412 16	369 11	43 05	236	1,172	2,327	23	950 00	108 33
61 Lakefield	185 57	165 61	19 96	1,782	994	2,242	15	569 96	
62 Lanark	381 51	357 43	24 08	194	1,273	3,818	17	837 02	70 00
63 Lancaster	279 42	233 05	46 37	220	2,665	3,027	5	1,300 00	

TABLE B.—Receipts, Expenditure, Assets and Liabilities of Free Libraries.—*Con.*

Free Libraries.	Receipts.	Expenditures.	Balance on hand.	Number of members.	Number of volumes in library.	Number of volumes issued.	No. of newspapers and periodicals.	Assets.	Liabilities.
	$ c.	$ c.	$ c.					$ c.	$ c.
64 Leamington	482 41	386 82	95 59	412	1,863	4,897	17	1,292 00	.....
65 Lindsay	1,113 77	1,101 07	12 70	989	3,366	16,823	47	3,512 70	50 00
66 Listowel	581 99	581 99	.....	567	2,621	5,200	21	1,900 00	221 69
67 Little Current..	126 90	126 84	06	265	1,189	3,300	.....	819 64	.....
68 London	10,836 94	8,810 77	2,026 17	5,000	14,767	81,122	190	38,026 17	20,730 61
69 Lucknow	387 20	383 88	3 32	344	3,024	5,729	1	1,600 00	.....
70 Merrickville....	558 53	506 80	51 73	247	2,221	4,485	.....	2,200 00	200 06
71 Merritton	234 33	165 54	68 79	204	1,519	2,344	.....	906 16	.....
72 Midland.....	723 69	671 97	51 71	350	2,067	8,904	21	1,001 71	218 37
73 Millbrook	419 59	391 63	27 96	296	1,640	5,932	28	1,161 08	209 00
74 Millgrove	234 65	234 65	.....	120	401	676	2	228 15	148 80
75 Milverton	314 27	285 22	29 05	191	1,537	2,348	.....	1,038 68	100 00
76 Mitchell	558 80	530 66	28 14	264	3,753	7,017	22	4,619 38	.....
77 Nairn Centre ..	106 88	106 88	.....	102	510	1,019	8	114 88	56 83
78 Napanee Mills.. (Strathcona P.O.)	229 11	229 11	.....	116	933	1,738	.....	400 00	133 39
79 Niagara Falls S.	185 06	179 03	6 03	292	2,240	2,466	.....	1,385 00	3 00
80 North Augusta.	382 64	369 14	13 50	121	1,173	669	.....	745 52	150 00
81 North Bay.....	294 63	272 65	21 98	260	1,802	3,235	16	1,629 48	18 75
82 Oil Springs ...	384 52	384 52	....	261	1,695	4,292	.. ..	1,283 00	.....
83 Oshawa	796 49	705 94	90 55	727	2,826	9,979	29	1,730 00	260 00
84 Otterville	187 30	145 54	41 76	183	586	2,915	.....	369 20	100 00
85 Paisley	433 99	420 57	13 42	365	4,129	6,202	20	2,700 00	46 25
86 Parkhill.....	196 13	189 27	6 86	334	1,864	4,129	.....	1,045 43	..... .
87 Parry Sound....	413 01	411 11	1 90	269	1,408	2,727	20	1,039 36	75 00
88 Penetanguishene	436 97	436 97	.....	320	4,523	11,530	8	2,456 77	..... .
89 Port Carling ...	142 16	141 59	57	126	1,286	897	12	543 00	50 00
90 Port Colborne ..	274 26	263 74	10 52	297	1,746	1,523	1	1,346 30	63 79
91 Port Rowan	327 95	306 27	21 68	279	1,782	3,774	....	1,883 28	200 00
92 Prescott.....	504 84	460 39	44 45	722	4,523	12,458	22	5,239 99	9 89
93 Primrose	151 87	133 57	18 30	123	921	1,480	.....	650 00	112 99
94 Renfrew	337 29	337 29	..	290	2,936	8,865	20	3,075 00	157 87
95 Richmond Hill..	286 53	240 92	45 61	130	2,734	3,534	28	1,925 00	.....
96 Ridgeway	147 22	145 25	1 97	98	904	1,812	....	663 18	....
97 Sault Ste. Marie	494 37	444 77	49 60	274	1,865	6,137	20	1,032 00	....
98 Seaforth.....	846 43	837 60	8 83	338	4,471	14,982	15	4,108 83	900 00
99 Shelburne	410 20	408 70	1 50	229	2,067	5,109	20	1,675 85	171 74
100 Simcoe	989 23	740 49	248 74	461	4,656	11,134	52	8,348 74	..... .
101 Smith's Falls ..	968 71	968 71	.....	624	4,344	13,970	26	1,985 00	229 51
102 Springfield	359 79	359 30	49	122	1,386	865	.....	1,028 04	386 00
103 Stayner	162 35	156 92	5 43	192	1,425	3,628	.....	934 00	35 00
104 Stouffville.....	318 04	311 12	6 92	450	3,500	5,460	30	3,905 00	.....
105 Stratford	1,451 53	1,204 62	246 91	1,400	5,770	35,376	41	4,531 83	.....
106 St. Catharines..	1,742 15	1,635 59	106 56	1,799	7,525	40,400	41	6,438 49	....
107 St. Mary's.....	591 46	521 97	69 49	650	4,543	11,223	23	2,450 00	200 00
108 St. Thomas	1,971 12	1,809 46	161 66	1,132	7,293	21,511	48	4,950 00	.....
109 Sundridge	196 42	196 42	.....	123	911	1,571	13	625 50	....
110 Tamworth	193 18	177 96	15 22	185	1,250	1,926	23	508 50	151 77
111 Tara	219 79	219 14	65	222	1,874	3,507	18	1,903 53	15 00
112 Thessalon	567 07	545 44	21 63	250	1,700	2,116	12	1,025 39	267 69
113 Thorold	655 64	622 97	32 67	700	4,509	8,120	19	3,060 00	.....
114 Toronto	34,116 79	33,196 38	920 41	45,522	117,127	556,196	946	256,043 97	53,511 68
115 Tottenham	202 67	202 67	.....	134	2,279	1,329	.....	1,192 60	47 13
116 Trenton	455 81	455 81	.....	580	1,445	5,806	64	1,400 00	286 80
117 Uxbridge	747 07	747 07	....	307	5,904	8,711	29	9,350 00	194 22
118 Wallaceburg ...	534 62	387 16	147 46	372	1,259	7,606	20	974 22	.....
119 Waterford.....	284 85	239 54	45 31	215	1,304	2,892	.....	890 00	.....
120 Waterloo	701 93	661 27	40 66	431	6,781	10,022	30	5,534 41	.....
121 Watford	396 52	396 14	38	280	2,322	5,439	20	1,600 00	194 38
122 Westford.....	104 04	103 49	55	56	1,179	372	....	967 00	.....
123 Wiarton.....	623 98	595 62	28 36	243	2,864	4,195	22	2,162 33	243 76
124 Windsor	3,954 09	2,615 07	1,339 02	1,200	9,133	44,887	57	8,874 75	.....
125 Wroxeter.....	354 58	346 24	8 34	263	3,847	3,397	11	3,989 40	3 10
126 Wyoming	137 94	137 94	.....	120	1,573	2,568	.....	2,000 00	.....
Total.....	126,834 86	117,305 34	9,529 52	111,879	510,054	1,810,450	3,453	642,756 55	113,451 74

PROPORTIONATE NUMBER OF VOLUMES IN PUBLIC LIBRARIES

Libraries with less than 250 Volumes.

Bunyan, Caistorville, Dundela, Freelton, Haileybury, Metcalfe, Munster, Ophir, Thornloe.—9.

Libraries with over 250 and less than 500 Volumes.

Allan's Mills, Ancaster, Angus, Cobden, Dalhousie (McDonald's Corners P O.), Drumbo, Haliburton, Madoc, Marksville, Millgrove, Newbury, New Dundee, Pakenham, Port Dover, Powassan, Rossean, Spencerville, Sprucedale, Sunnidale (New Lowell P.O.), Unionville, Wales.—21.

Libraries with over 500 and less than 1,000 Volumes.

Alma, Auburn, Bayham, Bervie, Binbrook, Bracondale, Bridgeburg, Burnstown, Cambray, Carp, Chesterville, Clarksburg, Copleston, Creemore, Don, Doncaster, Douglas, Dryden, Easton's Corners, Emsdale, Enterprise, Fenella, Fort Francis, Glen Allan, Gore's Landing, Hanover, Harrington, Harrow, Hawkesville, Hensall, Hepworth, Hillsburg, Holland Centre, Kemble, Kemptville, Kintore, Lakefield, Linwood, Manitowaning, Maple, Melancthon, Melbourne, Minden, Mississippi, Monkton, Mono Mills, Mount Albert, Nairn Centre, Napanee Mills, Odessa, Otterville, Pinkerton, Plattsville, Port Stanley, Primrose, Ridgetown, Riversdale, Rodney, Rosemont, Scotland, Shakespeare, Shallow Lake, South River, Sundridge, Thornbury, Thornhill, Trout Creek, Vankleek Hill, Vars, Warkworth, Wellesley, West Lorne, White Lake, Williamstown, Winchester, York, Zephyr.—77.

Libraries with over 1,000 and less than 1,500 Volumes.

Algonquin, Admaston, Alvinston, Atwood, Beaverton, Belmont, Belwood, Bloomfield, Blyth, Burford, Camden East, Cargill, Cayuga, Cheapside, Cold Springs, Coldstream, Coldwater, Cookstown, Copper Cliff, Delhi, Dresden, Dungannon, Dutton, Elmvale, Ethel, Grantham (St. Catharines P.O.), Highgate, Islington, Kinburn, Kinmount, Kingsville, Lanark, Lion's Head, Little Current, Lynden, Mallorytown, Mildmay, Morriston, North Augusta, Norwich, Oakwood, Omemee, Orono, Oxford Mills, Parry Sound, Port Carling, Port Credit, Princeton, Richmond, Rockwood, Russell, Schreiber, Shedden, Springfield, Stayner, St. Helens, Sunderland, Tamworth, Trenton, Wallaceburg, Waterford, Wardsville, Westford —63.

Libraries with over 1,500 and less than 2,000 Volumes.

Acton, Alvinston, Belfountain, Bothwell, Brooklin, Burk's Falls, Burlington, Chapleau, Chesley, Claremont, Colborne, Comber, Erin, Floradale, Fordwich, Gorrie, Glencoe, Hagersville, Highland Creek, Holyrood, Inglewood, Iroquois, Kars, Kirkfield, Lake Charles, Leamington, Little Britain, Manilla, Manotick, Merritton, Millbrook, Milverton, Mono Road, Nanticoke, Newburg, Newmarket, North Bay, North Gower, Norwood, Oil Springs, Palmerston, Parkhill, Pickering, Port Arthur, Port Colborne, Port Perry, Port Rowan, Queensville, Rat Portage, Romney, Sault Ste. Marie, Tara, Thessalon, Thamesford, Thedford, Tilbury, Tilbury East, Tiverton, Waterdown, Wheatley, Woodbridge, Wyoming.—62.

Libraries with over 2,000 and less than 2,500 Volumes.

Ailsa Craig, Amherstburg, Arkona, Arnprior, Beamsville, Beaton, Bobcaygeon, Bracebridge, Bradford, Brighton, Brussels, Caledonia, Cannington, Chatsworth, Chelten, ham, Duart, Dundalk, Essex, Glenmorris, Grand Valley, Gravenhurst, Huntsville, Lucan,

Markdale, Meaford, Merrickville, Midland, Morrisburg, New Hamburg, Niagara Falls South, Picton, Shelburne. Sparta, Tottenham, Underwood, Vandorf, Victoria, Walkerton, Watford, Woodville —40.

Libraries with over 2,500 and less than 3,000 Volumes.

Arthur, Aurora, Baden, Bolton, Caledon, Claude, Deseronto, Elmira, Ennotville, Fonthill, Fort Erie, Gananoque, Georgetown, Hespeler, Lancaster, Listowel, Markham, Oshawa, Point Edward, Renfrew, Richmond Hill, Sarnia, Streetsville, Tavistock, Tilsonburg, Toronto Junction, Weston, Whitby, Wiarton.—29.

Libraries with over 3,000 and less than 3,500 Volumes.

Aberarder, Almonte, Ayr, Elenheim, Bowmanville, Clifford, Cobourg, Cornwall, Dunnville, Fenelon Falls, Forest, Jarvis, Lindsay, Lucknow, Mount Forest, Oakville, Orangeville, Port Elgin, Ridgetown, Teeswater, Thamesville, Welland, Wingham —23.

Libraries with over 3,500 and less than 4,000 Volumes.

Aylmer, Brampton, Campbellford, Carleton Place, Clinton, Durham, Exeter, Goderich, Ingersoll, Mitchell, Napanee, Orillia, Southampton, Stouffville, Wroxeter.—15.

Libraries with over 4,000 and less than 5,000 Volumes.

Alton, Barrie, Belleville, Cardinal, Collingwood, Embro, Fergus, Galt, Grimsby, Harriston, Kincardine, Owen Sound, Paisley, Penetanguishene, Perth, Port Hope, Prescott, Scarboro, Seaforth, Simcoe, Smith's Falls, St. George, St. Mary's, Thorold.—24.

Libraries with over 5,000 and less than 6,000 Volumes.

Garden Island, Milton, Niagara, Niagara Falls, Preston, Strathroy, Stratford, Uxbridge, Woodstock.—9.

Libraries with over 6,000 and less than 8,000 Volumes.

Berlin, Chatham, Dundas, Kingston, Paris, St. Catharines, St. Thomas, Waterloo.—8.

Libraries with over 8,000 and less than 10,000 Volumes.

Brockville, Elora, Peterborough, Windsor.—4.

Libraries with over 10,000 and less than 20,000 Volumes.

Brantford, Guelph, London.—3.

Library with over 20,000 and less than 30,000 Volumes.

Hamilton.—1.

Library with over 100,000 Volumes.

Toronto.—1.

TABLE C.—Evening Classes in Drawing in Public Libraries.

Public Library.	Number of Students.	Primary Course.
Peterborough	25	Geometry, Perspective.
Total	25	

Public Library.	Number of Students.	Mechanical Course.
Galt	10	Descriptive Geometry, Machine Drawing, Building Construction, Architectural Designs, Advanced Perspective.
Peterborough	25	Machine Drawing
Total	35	

III. ART SCHOOLS AND DEPARTMENTAL DRAWING EXAMINATIONS.

Tables D to H show the number of Certificates awarded from the commencement of this branch of the Education Department—1882 to 1901.

TABLE D.—Certificates awarded in Primary Art Courses from 1882 to 1901.

Year.	Freehand drawing.	Geometry.	Perspective.	Model drawing.	Blackboard drawing.	Teacher's certificates.	Total.
1882	28	21	17	12	28		106
1883	84	89	58	47	76		354
1884	153	174	139	138	86	66	756
1885	214	529	301	168	198	122	1,532
1886	634	672	149	662	414	77	2,608
1887	643	1,204	428	444	122	103	2,944
1888	805	882	520	403	236	133	2,979
1889	1,002	961	394	470	494	187	3,508
1890	1,000	1,009	290	811	313	130	3,553
1891	1,085	1,569	292	746	422	164	4,278
1892	1,361	1,419	569	1,120	720	338	5,527
1893	1,769	1,277	439	876	392	220	4,973
1894	1,383	719	548	550	562	153	3,915
1895	1,813	1,429	658	1,311	991	341	6,543
1896	1,195	569	361	1,110	1,121	265	4,621
1897	716	500	212	704	516	114	2,762
1898	854	311	173	1,224	604	149	3,315
1899	1,062	465	168	1,128	1,170	160	4,153
1900	1,000	254	194	675	1,007	130	3,260
1901	1,366	87	59	605	431	29	2,577
Total	18,167	14,140	5,969	13,204	9,903	2,881	64,264

TABLE E.—Certificates Awarded in Advanced Art Course from 1883 to 1901.

Year.	Shading from flat.	Outline from round.	Shading from round.	Drawing from flowers.	Ornamental design.	Industrial design.	Teachers' certificates.	Total.
1883	5	5	12	18	.....	.....	.....	40
1884	16	5	12	12	.....	.....	.....	45
1885	33	18	35	29	.....	.....	4	119
1886	35	24	19	48	.....	.....	3	129
1887	59	27	28	25	34	.....	14	187
1888	22	17	39	44	20	.....	9	151
1889	65	36	58	24	25	.....	14	222
1890	62	30	76	43	22	.....	15	248
1891	80	52	67	66	38	.....	23	326
1892	24	32	53	72	37	.....	13	231
1893	58	54	73	62	54	.....	13	314
1894	31	44	58	79	68	.....	24	304
1895	56	52	78	58	29	.....	11	284
1896	60	74	103	113	.....	29	17	396
1897	61	47	126	95	.....	41	18	388
1898	67	73	169	187	.....	44	18	558
1899	61	69	152	160	.....	57	22	521
1900	80	55	82	119	.....	31	17	384
1901	76	37	133	82	.....	85	13	426
Total	951	751	1,373	1,336	327	287	248	5,273

TABLE F.—Certificates awarded in Industrial Art Course from 1885 to 1901.

Year.	Modelling in clay.	Wood carving.	Wood engraving.	Lithography.	Painting on china.	Total.
1885	14	.....	.....	.....	.....	14
1886	11	7	.....	.....	.....	18
1887	8	2	.....	.....	.....	10
1888	10	3	1	1	9	24
1889	7	1	3	2	6	19
1890	7	4	.....	1	6	18
1891	5	2	1	.....	7	15
1892	2	1	.....	1	3	7
1893	5	2	.....	1	3	11
1894	4	2	.....	2	10	18
1895	5	3	2	6	18	34
1896	3	2	.....	3	30	38
1897	5	3	1	4	17	30
1898	7	5	.....	1	17	30
1899	9	14	.....	2	17	42
1900	17	14	.....	6	6	43
1901	9	12	.....	2	8	31
Total	128	77	8	32	157	402

TABLE G.—Certificates awarded in Mechanical Drawing Course from 1883 to 1901.

Year.	Advanced geometry.	Machine drawing	Building construction.	Industrial design.	Architectural design.	Advanced perspective.	Teachers' certificates.	Total.
1883	2	3	1.	2	.....	3	.....	11
1884	1	1	1	1	.....	1	.... ..	5
1885	12	32	4	25	.....	12	4	89
1886	14	13	5	28	.....	14	3	77
1887	6	5	12	18	.....	6	2	49
1888	8	7	7	15	.....	11	2	50
1889	13	23	11	20	.....	12	3	82
1890	11	23	5	8	.....	12	2	61
1891	3	31	8	31	....	28	2	103
1892	17	25	13	38	. .....	15	2	110
1893	14	33	10	47	.....	35	10	149
1894	12	17	6	90	.....	9	3	137
1895	5	22	9	31	.....	12	3	82
1896	7	9	5	.....	9	12	3	45
1897	16	13	4	.....	6	15	.....	54
1898	6	19	2	.....	7	8	.....	42
1899	25	20	5	....	7	18	.....	75
1900	14	8	12	.. ..	5	14	.....	53
1901	21	18	2	.....	14	15	1	71
Total	207	322	122	354	48	252	40	1,345

TABLE H.—Certificates awarded for Extra Subjects from 1885 to 1901.

Year.	Drawing from the antique.	Shading from casts.	Architectural designs.	Drawing from life.	Painting from life	Painting oil colors.	Painting water colors.	Sepia.	Monochrome.	Pastel.	Sculpture in marble.	Photogravure.	Repousse work.	Industrial design.	Pen and ink.	Machine drawing.	Engraving on copper.	Crayon portraits.	Total.
1885	....	..	..	....	.	9	7	....	..	..	..	..	..	....	..	..	..	..	16
1886	....	..	..	..	..	12	7	....	..	..	..	..	..	....	..	..	..	..	19
1887	....	..	..	7	..	32	9	....	..	..	..	..	2	....	.	..	..	..	50
1888	....	..	..	15	12	25	14	13	1	..	2	..	2	....	..	..	..	..	84
1889	....	..	..	12	8	16	21	3	2	..	..	..	..	..	..	..	..	..	62
1890	....	..	..	7	4	28	18	10	4	..	..	..	..	....	..	..	..	..	71
1891	....	..	..	4	5	29	26	3	6	..	..	..	..	....	..	..	..	..	73
1892	..	..	..	2	6	21	16	7	1	..	..	..	..	....	..	..	..	2	55
1893	11	..	2	5	9	35	21	7	4	..	..	..	..	....	..	..	..	..	94
1894	11	..	2	8	6	29	16	5	7	..	..	..	..	10	..	1	..	..	95
1895	26	..	6	14	4	39	24	10	1	..	..	..	..	17	..	5	1	..	147
1896	14	..	..	12	6	34	38	6	1	2	..	1	..	13	1	1	..	..	129
1897	19	11	1	17	6	38	42	7	3	3	..	3	..	22	3	4	..	..	179
1898	22	12	..	12	9	37	28	7	6	6	1	6	..	15	4	6	..	..	171
1899	19	14	..	17	2	10	22	8	1	4	..	3	..	31	13	5	..	..	149
1900	29	30	..	13	4	17	10	12	5	5	..	3	..	14	10	4	.	..	156
1901	25	17	..	9	1	11	18	14	4	4	..	4	..	13	16	6	..	..	142
Total	176	84	11	154	82	422	337	112	46	24	3	20	4	135	47	32	1	2	1,692

TABLES I to M.—Show the number of Certificates awarded to Art Schools in 1901.

TABLE I.—Certificates awarded to Art Schools in 1901.—Course.

Name of School.	Number of students for examination.	Number of certificates.						Number of teacher's certificates.	Grants for certificates.
		Freehand.	Geometry.	Perspective.	Model.	Blackboard.	Total proficiency certificates.		
									$ c.
Kingston Art School	24	7	4	.....	5	2	18	.....	13 00
Hamilton "	101	43	10	4	23	11	91	1	77 00
London " (Mr. Peel's School)	17	4	1	..	3	2	10	...	...
St. Thomas "	56	36	3	12	18	18	87	4	21 00
Toronto "	54	22	2	1	20	17	62	...	46 00
	252	112	20	17	69	50	268	5	157 00

TABLE J.—Certificates awarded to Art Schools, 1901.—Advanced Course.

Name of School.	Number of students for examination.	Number of certificates.						Number of teacher's certificates.	Grants for certificates.
		Shading from flat.	Outline from round.	Shading from round.	Drawing from flowers.	Industrial design.	Total proficiency certificates.		
									$ c.
Kingston Art School	9	1	4	2	2	4	13	1	9 00
Hamilton "	104	29	12	36	24	9	110	5	81 00
London " (Mr. Peel's School)	5	2	1	2	2	2	9	...	...
St. Thomas "	31	6	1	15	1	3	26	1	23 00
Toronto "	69	13	10	28	27	12	90	4	61 00
	218	51	28	83	56	30	248	11	174 00

TABLE K.—Certificates awarded to Art Schools, 1901.—Mechanical Course.

Name.	Number of students for examination.	Number of certificates.						Number of teacher's certificates.	Grants for certificates.
		Advanced geometry.	Machine drawing.	Building construction.	Architectural design.	Advanced perspective.	Total proficiency certificates.		
									$ c.
Kingston Art School	8	2	2	.....	...	1	5	.....	4 00
Hamilton "	41	4	4	.....	7	5	20	...	20 00
London " (Mr. Peel's School)	2	2	.....	.....	.....	2	4	.....	...
St. Thomas "	12	3	1	.....	2	1	7	1	6 00
Toronto "	17	1	.....	2	5	.....	8	....	8 00
	80	12	7	2	14	9	44	1	38 00

TABLE L.—Certificates awarded to Art Schools, 1901.—Industrial Art Course.

Name.	Number of students for examination.	Number of certificates.						Number of teacher's certificates.	Grants for certificates.
		Modeling in clay.	Woodcarving.	Photogravure.	Lithography.	Painting on china.	Total proficiency certificates.		
									$ c.
Kingston Art School	2	1	.....	.....	.....	1	2	.....	2 00
Hamilton "	12	4	2	4	2	1	13	.....	12 00
St. Thomas "	4	3	1	.....	.....	.....	4	.....	4 00
Toronto "	4	1	2	.....	.....	.....	3	.....	3 00
	22	9	5	4	2	2	22	.....	21 00

TABLE M.—Certificates awarded to Art Schools, 1901.—Extra Subjects.

Name.	Number of students for examination.	Number of certificates.												Total certificates.
		Painting from life.	Painting, oil colors.	Painting, water colors.	Monochrome.	Sepia.	Pastel	Drawing from life.	Pen and ink sketches.	Shading from antique.	Shading from casts.	Industrial designs.	Machine drawing.	
Kingston Art School	4	....	....	....	....	....	....	....	1	....	...	....	....	1
Hamilton "	33	....	....	6	1	11	....	2	4	1	14	5	3	47
London " (Mr. Peel's Sch.)	1	1	1	1	....	....	....	....	...	....	....	....	...	3
St. Thomas "	11	....	....	....	.. .	....	1	....	1	....	...	1	2	5
Toronto "	31	....	....	....	1	2	....	7	10	23	3	7	....	53
	80	1	1	7	2	13	1	9	16	24	17	13	5	109

TABLE N.—Certificates awarded to Public and High Schools, Ladies' Colleges, etc., 1901.—Primary Course.

Name.	Number of students for examination.	Number of Certificates.						Number of Teachers' Certificates.
		Freehand.	Geometry.	Perspective.	Model.	Blackboard.	Total Proficiency Certificates.	
Arthur High School	34	23			7	9	39	
Athens "	97	32	2	12	8	12	66	6
Belleville "	52	19	1	1	4	3	28	
" Albert College	19	10	1		4	5	20	1
Bloomfield Public School	19	5	2		2		9	
Brockville Collegiate Institute	103	44	1	2	17	23	87	1
Clinton High School	53	27			18	14	59	
Cobourg Collegiate Institute	28	22	1		9	4	36	
Deseronto High School	49	16	4		1	2	23	
Forest "	13	3			3	3	9	
Hamilton Collegiate Institute	47	30			16	9	55	
" Central School	90	33			24	12	69	
" Cannon Street School	64	36			22	13	71	
" Hess Street School	143	59	1		26	12	98	
" Queen Victoria School	82	57	5	6	23	16	107	1
" Ryerson School	114	59	22	10	29	20	140	8
" Victoria District	121	67			30	10	107	
Leamington High School	21	16	1	1	13	9	40	1
London Collegiate Institute	210	85			32	27	144	
Markham High School	83	29	3		13	3	48	
Merrickville Public School	40	20				1	21	
Morrisburgh "	19	11			1		12	1
" Collegiate Institute	53	18			1	8	27	
Newmarket High School	27	18	2		4	3	27	
" Public School	11	6			2	2	10	
Niagara Falls Loretto Convent	38	19			1	1	21	
Oshawa High School	66	35			6	8	49	
Orillia Collegiate Institute	56	25	1		15	3	44	
Owen Sound Collegiate Institute	61	53	4	1	17	15	90	
Perth " "	13	4			2		6	
Peterboro' Public School	44	29				2	31	
" " Library	23		2				2	
Picton High School	87	50	5	6	31	16	108	3
Port Dover High School	19	12			5	5	22	
Richmond Hill High School	37	4			1	3	8	
Stratford Loretto Convent	20	10	1		3	1	15	1
St. Thomas Alma College	8	3			5	3	11	
Toronto Havergal College	21	11			9	11	31	
" Harbord St. Coll. Inst.	109	81			45	47	173	
" Jameson Ave. "	17	16	1	1	12	12	42	
" Lansdowne Public School	8	1			1	1	3	
" St. Joseph's Convent	17	7			5	1	13	
" Parkdale Public School	9	5			4	5	14	
Uxbridge High School	26	15			7	2	24	
Wallaceburg Public School	80	31			2	1	34	
Whitby Collegiate Institute	59	25			6	3	34	1
Windsor " "	123	42	7	1	39	11	100	
Woodstock " "	81	31		1	11	10	53	
Total	2,614	1,254	67	42	536	381	2,280	24

TABLE O.—Certificates awarded to High Schools, Ladies' Colleges, etc., 1901.—Advanced Course.

Name.	Number of students for examination.	Number of Certificates.						Number of Teachers' Certificates.
		Shading from flat.	Outline from round.	Shading from round.	Drawing from flowers.	Industrial design.	Total Proficiency Certificates.	
Belleville Albert College	14	4	..	6	3	4	17	.....
" High School	25	.....	.....	3	.....	.....	3	.....
Brockville Collegiate Institute	1	.....	.....	...	.....	.....	.....	.....
London " "	83	.....	.....	.....	.....	30	30	.....
Markham High School	22	2	.....	2	1	.....	5	.....
Niagara Falls Loretto Convent	24	4	.....	20	2	8	34	.....
Stratford " "	12	2	2	4	1	3	12	1
St. Thomas Alma College	10	3	4	5	4	5	21	1
Toronto Havergal College	15	3	2	4	10	.....	19	.....
" Lansdowne Public School	7	.....	.....	1	1	.....	2	.....
Whitby Collegiate Institute	2	.....	.....	.....	.....	.....	.....	.....
Windsor " "	19	7	1	5	4	5	22	.....
	234	25	9	50	26	55	165	2

TABLE P.—Certificates awarded to High Schools, etc., 1901.—Mechanical Course.

Name.	Number of students for examination.	Number of Certificates.						Number of Teachers' Certificates.
		Advanced geometry.	Machine drawing.	Building construction.	Architectural design.	Advanced perspective.	Total Proficiency Certificates.	
Arthur High School	1	.....	.....	.....	.. .	.....	.....	.....
Brockville Collegiate Institute	1	. .	.....	. ....	.....	...	.....	.....
Cobourg " "	1	1	.....	...	.....	.....	1	.....
Cornwall High School	1	1	.....	.....	.....	.....	1	.... .
Galt Public Library	8	1	1	.....	.....	.....	2	.....
Highgate	1	... ..	.....	....	.....	1	1	.....
Leamington High School	1	1	.....	.....	.....	1	2	.....
Markham "	1	.....	.....	.....	.....	1	1	.....
Orillia Collegiate Institute	1	.....	.....	.....	.....	1	1	.....
Peterborough Public Library	15	.....	10	...	.....	.. ...	10	...
Windsor Collegiate Institute	7	4	.....	.....	.....	1	5	.....
Woodstock " "	1	1	.. ..	.....	.....	1	2	.. ..
	39	9	11	....	.....	6	26	.....

TABLE Q —Certificates Awarded to Ladies' Colleges, etc., 1901.—Industrial Art Series.

Name.	Number of students for examination.	Number of Certificates.					Total Certificates.
		Modelling in clay.	Wood-carving.	Photogravure.	Lithography.	Painting on china.	
Belleville, Albert College	4					2	2
St. Thomas, Alma College	3					3	3
Toronto, Havergal College	9		7			1	8
	16		7			6	13

TABLE R.—Certificates Awarded to Ladies' Colleges, etc., 1901.—Extra Subjects

Name.	Number of students for examination.	Number of Certificates.							Total Certificates.
		Painting, oil colors.	Painting, water colors.	Monochrome.	Sepia.	Pastel.	Shading from the antique.	Machine drawing.	
Belleville, Albert College	4	2	3						5
Peterborough, Public Library	2							1	1
Picton, High School	1								
St. Thomas, Alma College	7	6	2	2	1	2	1		14
Toronto, Loretto Convent	11	2	4						6
Toronto, St. Joseph's Convent	2					1			1
Whitby, Collegiate Institute	2		2						2
	29	10	11	2	1	3	1	1	29

TEACHERS' FULL CERTIFICATES.

The following full certificates in the Primary and Advanced Courses were awarded in 1901:

1. Teachers' Full Certificate—Primary Course.

Name.	Address.	Name.	Address.
Males.		*Males.*	
Austin, George	Hamilton.	Spera, Herbert	Hamilton.
Baker, Mason	St. Thomas.	Ward, Cecil	Hamilton.
Barber, Fred. W.	Athens.	Wood, Gilbert	Morrisburgh.
Campbell, Wm.	Hamilton.		
Cughan, Robert	Athens.	*Females.*	
Huston, Egbert	Picton.		
Hutchison, Geo. W	Athens.	Adkins, Pertha	St. Thomas.
Kleinsteiber, Wm	Hamilton.	Armstrong, Bessie	Hamilton.
Kingston, Harold	Picton.	Cadwell, Myrtle	Athens.
Madgett, Clark	Hamilton.	Fleck, Grace	Hamilton.
Mathison, Frank	Whitby.	Hornby, Bertha	Hamilton.
Murphy, O. W.	Athens.	Jones, Kate	St. Thomas.
Osborne, J. G	Belleville.	Macklin, Olive	Stratford.
Pain, Albert	Hamilton.	McCrone, May	St. Thomas.
Rhodes, T. B	Athens.	Scratch, Linnie M.	Leamington.
Sheridan, Harold	Brockville.	Welbanks, Violet	Picton.

2 Teachers' Full Certificate—Advanced Course

Name.	Address.	Name.	Address.
Adkins, Bertha	St. Thomas.	Macklin, Olive	Stratford.
Dixon, Jessie B	Hamilton.	Martin, Arthur	Kingston.
Dixon, Mabel B	Hamilton.	Purvis, Paul P	Hamilton.
Eamatinger, Beatrice	St. Thomas.	Snowball, F. L	Toronto.
Cruickshank, W. D	Hamilton.	Stevenson, David	Toronto.
Gaunt, Ethel	Toronto.	Soper, Florence A	Hamilton.
Long, Marion	Toronto.		

3. Teachers' Full Certificate—Mechanical Course.

Name.	Address.
Johnson, Robert W	St. Thomas.

Gold, Silver and Bronze Medals Awarded in 1901.

The following medals and special certificates were awarded for the year ending 30th April, 1901:

Gold Medal.

Presented by the Minister of Education for Advanced Course:—Original and industrial designs and drawings from the antique, Carmen Maynard, Toronto Art School.

Silver Medal and Certificate.

Presented by the Minister of Education for the best original industrial design, Winnifred McKay, Toronto Art School.

Silver Medal and Certificate.

Presented by the Minister of Education for the best Machine Drawing from models Robert W. Reid, Hamilton Art School.

Silver Medal and Collegiate.

Presented by the Minister of Education for the best original drawings in Architectural Design, L. McG. Allen, Toronto Art School.

Silver Medal and Certificate.

Presented by the Minister of Education for the best original drawings in buildin construction, Joseph A. Carson, Hamilton Art School.

Bronze Medals

For the best painting from life, Florence Woodman, London, Mr. Peel's Art School.

For the best specimen of painting (oil colors), Florence Woodman, London, Mr. Peel's Art School.

For the best specimen of painting (water colors), Ida Story, Whitby Collegiate Institute.

For the best specimen of china painting, Aida Gentles, Havergal Ladies' College, Toronto.

For the best drawing from life, H. S. Palmer, Toronto Art School.

For the best specimen of pen and ink drawing, Mary W. Robertson, Toronto Art School.

For the best specimen of lithography, Frank Rines, Hamilton Art School.

For the best specimen of drawing for Photogravure, Frank Hazel, Hamilton Art School.

For the best specimen of wood carving, E. C. Edwards, Toronto Art School.

For the best specimen of modelling in clay, E. Hahn, Toronto Art School.

For the highest number of marks in Primary Art Course (Art Schools), Mason Baker, St. Thomas Art School.

For the highest number of marks, Primary Art Course (High School and Collegiate Institutes, Harold Sheridan, Brockville Collegiate Institute.

For the highest number of marks, Primary Art Course (Public Schools), Clark Madgett, Hamilton Ryerson School.

EXAMINATION PAPERS.

The total number of examination papers sent out in 1901 was as follows:

Primary Course.

Freehand	2,442	
Geometry	1,137	
Perspective	1,007	
Model Drawing	2 516	
Blackboard Drawing	2,458	
		9,560

Advanced Course.

Shading, flat	199	
Outline, round	116	
Shading, round	218	
Flower Drawing	206	
Industrial Design	168	
Competition for gold medal	5	
		912

Mechanical Course.

Advanced Geometry	57	
Machine Drawing	78	
Building Construction	44	
Architectural Design	18	
Advanced perspective	57	
		248
Total		10,720

ART SCHOOLS, ETC.

REPORTS FOR THE YEAR ENDING 30TH APRIL, 1901.

1. *Hamilton Art School.*—The Report of the Hamilton Art School for the year ending 30th April, 1901, shows that at the Annual Meeting held in May 1900, opposing interests came into conflict as to the work that should be done in the School ; some persons advocated that only Fine Arts proper, including Painting from Life, should be taught. The majority however decided that the principal instruction should consist of Industrial Design, technical drawing, modelling, etc., supplemented with instruction in Painting, etc. A new Board of Directors was elected, and it has been found that although the School has been in existence since 1886, that no constitution and by-laws had ever been submitted to the subscribers and members. The new Directors compiled a constitution and by-laws which were submitted to the subscribers. The constitution provides for fixed dates for meetings, and that the name be changed to the Hamilton School of Art, Design, and Technology. The Mayor, Chairman of the Public Library, and the Chairman of the School Board, are appointed ex officio Members.

The Report says.—"The principal, assistants, and the Board of Managers have worked zealously and harmoniously and they consider the past year the most successful in the history of the School."

During the year a new class was organized for higher mathematics directly pertaining to the solution of formulae, required to obtain the strength, strain, and stress of materials, mechanical movements, etc.

The number of students enrolled during the year was 220, being 145 males, and 75 females. 7,040 attendances were registered ; 2,080 of which were for the evening classes.

This School was again very successful in obtaining a large number of medals and certificates.

The students in attendance registered under the following trades and professions, viz ;—Apprentices, architectural students, bridge workers, bricklayers, cabinet makers, carpenters, clerks, chenille workers, dressmakers, draughtsmen, engineers, gas-fitters, grocers, hairdressers, lace makers, lithographers, merchants, marine engineers, newspaper artists, pattern makers, printers, students, stenographers, teachers, tailors, tin plate workers, watchmakers, woodturners.

The receipts, including government grant, were $2,695.11 ; expenditure, $2,628.00 ; balance on hand, $67.11.

2. *Kingston Art School.*—The Annual Report of the Kingston Art School for the year ending 30th April, 1901, shows that during the session 37 students have taken one or more subjects in the primary course, 19 in the advanced course, 20 in the mechanical course, 14 in the industrial art course, and 12 in painting in oil and water colors.

The students in the evening classes represented the following trades and professions, viz,—Boat builders, blacksmiths, carpenters, cheesemakers, clerks, millers, painters, teachers, etc.

The total receipts for the year, including goverment grant, were $467.55 ; expenditure, $467.55.

3. *London Art School.*—This school is temporarily closed.

4. *St. Thomas Art School.*—The Report of the St. Thomas Art School for the year ending 30th. April, 1901, show that 79 students attended, 62 taking one or more subjects in the primary course, 20 one or more subjects in the advanced course, 22 or more subjets in the mechanical course, and 15 one or more subjects in the industrial art course.

The students in attendance represented the following trades and professions,- Apprentices, clerks, carpenters, draughtsmen, engineers, gardeners, machinists, music teachers, and teachers.

At the examination held in April, one pupil was awarded a teacher's certificate and bronze medal in the primary course. In all, 87 certificates were awarded in the primary course, 26 in the advanced course, 7 in the mechanical course, and 4 in the industrial art course, beside 5 special certificates in pastel, machine drawing, and pen and ink drawing.

This School is incorporated with the St. Thomas Free Library, which contributes towards its maintenance. The receipts and expenditures are included in the report of the Free Library.

5. *Toronto Art School* —The Report of the Toronto Art School for the year ending 30th April, 1901, shows that the number of students on the roll was 197 : of these 85 were female, and 112 male. The aggregrate attendance for the 84 lesson days of the session was 9,303.

The following trades and professions were represented by the students,—Architects, bricklayers, carpenters, china decorators, crayon artists, clerks, decorators, draughtsmen, designers, diamond setters, dressmakers, engravers, glass stainers, musicians, machinists, ornamental plasterers, jewellers, lithographers, miniature painters, photographers, portrait painters, public school teachers, printers, stenographers, students, sign writers, wood carvers etc.

Students from the following outside points attended this school,—Bowmanville, Bobcaygeon, Barrie, Bradford, Brampton, Clarksburg, Collingwood, Eglington, Fenelon Falls, Guelph, Hastings, Little Britain, Marsville, Seagrove, Strathroy, Sutton West, Welland, West Lorne.

One each Gold, Silver and Bronze Medals, and a large number of Certificates, were awarded to the students at the last Provincial Art Examination.

Lectures on Painting and Drawing and Out-door Art work were given and well attended.

Receipts, including government grant, $3,533.27 ; expenditure, $3,496.73 : balance on hand, $36 54.

6. *Ontario Society of Artists* —The Annual Report of the Ontario Society of Artists shows that the following Exhibitions were held during the year,—

Industrial exhibition, Toronto, 301 exhibits.
Annual Exhibition in Society's rooms, 150 exhibits.
Exhibition Association, Winnipeg, selected pictures.
An exhibition of Applied Art, and an Architectural Exhibition, were also held in the Art Gallery.

The two works selected by the Ontario Society of Artists, for the Provincial Art Gallery, were, Geo. Chavignaud " Sunset, Holland " ; H. Martin " North Transept of St. Marks Church, Venice."

Receipts, including government grant, $4,300.52 ; expenditure, $2,423.69 ; balance on hand, $1,876.83.

7. *Provincial Art Gallery and Educational Museum.*—In 1895, the Act made provision that out of the annual government grant of $500.00 to the Ontario Society of Artists, two pictures to the value of $200.00 shall be purchased annually from the members of the Society of Artists ; said pictures to become the property of the Education Department for the Provincial Art Gallery.

The following pictures have been selected by the Ontario Society of Artists.—
1896—Atkinson " Evening " ; Knowles " Notre Dame ".
1897—Manly " Dartmoor " ; Mary A Reid " Roses ".
1898—Blatchly " A Quiet Pool " ; Gagen " When the Tide is Low ".
1899—Challener " When the Lights are Low " ; Muntz " On the River, Holland ".
1900—G. A. Reid " Reading " ; Tully " At the Loom ".
1901—Chavignaud "Sunset, Holland" ; H. Martin, "Transept, St. Mark's, Venice."

In 1897, the Minister of Education entered into an agreement with the Ontario Society of Artists that, if the Society would keep one of the large galleries in the Educational Museum filled with the most recent work of its members, pictures would be purchased annually by the Government to the amount of $800 00. Part of these pic-

tures are at the Parliament Buildings, and the following are in the Provincial Art Gallery :—

1897.

Bell-Smith, "Island Park."
Knowles, "Pool of London."
Sherwood, "Gold Prospector."

1898.

Bell Smith, "Westminster Bridge."
Blatchly, "Spring on the Hill."
Challener, "Milk Maid."
Coleman, "Farm, St Lawrence River."
Cotts, "Coast of Dorset."
Gagen, "Magog's Hills."
Manly, "Stour at Canterbury ;" "A Water Gate."
T. Martin "Road Through the Beeches."
Matthews, "Tops of Mount Stephen."
Rolph, "Humber River."
Spurr, "Surrey Heath."
Tully, "Jeannie."

1899.

Blatchly, "In the Woods"
Hagarty, "Luxembourg Gardens."
Spurr, "Mill, Red Hill, Surrey."
Staples, "Changing Pastures."
Vernon, "Sunset."

1900.

Atkinson, "Winter in Holland."
Challener, "Fireside Fancies."
Carlyle, "Rose Birthday."
Martin, H. "Holy Cross Abbey."
Muntz, "In the Sunlight"
O'Brien "Camping Out ;" "Gathering Hay.'
Reid, Mary H., "A Poppy Garden."
Reid, G. A., "Berry Pickers."
Tully, "Monday Morning."

1901.

Atkinson, "Evening."
Blatchly, "Landscape."
Brigden, "Evening on the River."
Chavignaud, "Sunset near Siluis."
Gagen, "Mount Sir Donald."
Manly, "Dropping Down at Glencoe."
Muntz, "Drawing Water."
Reid, G. A, "After Rain."

LITERARY AND SCIENTIFIC INSTITUTIONS.

1. *Hamilton Literary and Scientific Institution.*

The report of the Hamilton Literary and Scientific Institution for the year ending 30th April, 1901, shows that ten meetings of the general association were held, at which the following papers were read and discussed :

(1) Inaugural Address, S. A. Morgan, B.A., President.
(2) Duties of Speaker of House of Commons, Hon. T. Blair.

(3) Place names in Wentworth, J. H. Smith, I.P.S.
(4) Light and Color, Prof. Abbo', Toronto University.
(5) Great Events in Astronomy, Dr. D. V Lucas.
(6) Life and Character of Plants, Prof. Jeffrey, Toronto University.
(7) Church Architecture in Northern France, Prof. Squair, Toronto University.
(8) Natural History Notes, Wm. Yates.
(9) X-Rays, by Dr. Cumming.
(10) The Relation of Matter to Spirit, Dr. Baugh.

Prof. Fletcher, of the Experimental Farm, Ottawa, has been appointed to represent the association at the Royal Society meeting.

The Museum still continues to do excellent work. It has been kept open on Saturday afternoons to allow visitors to study the specimens, and many have availed themselves of this opportunity to become acquainted with the various objects of scientific interest.

The Geological Department still keeps up its prestige. During the year specimens have been sent to the British Museum of Natural History, the Dominion Museum at Ottawa, the Washington Museum, and others ; all of which have been acknowledged. A collection of fossil specimens were also sent to the St Catharines Public Library Board. Five papers of geological interest were read during the session.

The Biological Section has increased its collection which will be described in full in the printed journals of proceedings. This section has also joined the American Lantern Slide Exchange, and sent a collection of Canadian slides to New York. Several interesting and useful demonstrations were given in this department during the year. The usual annual exhibition of photographs was held in November. Medals were awarded in six departments.

The receipts, including Government grant, were $731.30; expenditure, $543.55; balance on hand, $187 75.

2. *Ottawa Literary and Scientific Society* —The Report of the Ottawa Literary and Scientific Society for the year ending 30th April, 1901, shows that the Annual Course of Lectures was inaugurated by a conversazione with vocal and instrumental music, display of works of art, etc.

The following lectures were given during the session :—

(1) Land and Letters of the Pastons (illustrated), Prof. Prince.
(2) Windsor Castle and its Memories (illustrated), O. J. Jolliffe.
(3) South African Sidelights, Capt. C F. Winter.
(4) The State of Labour, with special reference to Canadian Legislation, H. A. Harper M.A.
(5) The Feudal System in Canada, Benjamin Sulte
(6) Canadian Novels and Novelists, L J. Burpee.
(7) Modern Types of Danger Warnings on the Sea Coast, Lt.-Col. W. P. Anderson, C E.
(8) The origin of Legal Obligations, Charles Morse, D.C.L.
(9) Some Thoughts on Social Progress, W. L. M. King, M A., LL B.
(10) Meterology, Otto J. Klotz
(11) Heredity in its Scientific and Practical Aspects, Prof. Prince.

The Reading Room is supplied with forty Magazines and Reviews, and about a dozen leading newspapers.

The Library has increased this year by 240 volumes, making the total number of volumes in Library, 4,413. The number of volumes issued was 6,250 Volume No. 2 of the Transactions of the Society has been published

Receipts including the government grant, $1,110 84 ; expenditure, $1,062 36 ; balance on hand, $39 48.

3 *Institut Canadien Francais d'Ottawa* —The Report of the Institut Canadien Francais d'Ottawa for the year ending 30th of April, 1901, shows that the proceedings during the year included lectures and readings, as follows :—

(1) Champlain and his Time, Benj. Sulte, President.
(2) Papineau and his Time, do do

(3) Origin of Family Names, Father Le Jeune.
(4) Origin of Mathematics, A. Belanger
(5) The Napoleonic Legend, Mr. de Labriolles.
(6) The Works of Alphonse Daudet, Madame Margueron
(7) Philosophers of the 18th Century, Dr L M. Pelletier.
(8) Orators of the French Revolution, Mr. DeCelles.

Fifteen concerts and dramatic entertainments were given during the winter months, to which the public were admitted. The Convention of the French School Teachers of the Billinguous Association met in the building, and the main speech was delivered by the President of the Institute.

Receipts, including government grant, $1,365.00 ; expenditure, $1,872.32 ; deficit for improvements, etc., $507.32.

4. *St. Patrick's Literary and Scientific Association, Ottawa.*—The Report of the Literary and Scientific Association for the year ending 31st December, 1900, shows that this Association is doing the work of a Public Library. They expended $185.94 for Books, and $48 45 for Magazines and Newspapers. The Library and Reading Room were open five hours a day, six times a week. The Reading Room was well attended and the following Books were issued from the Library,—History 49, Biography 28, Voyages and Travels 13, Science and Art 1, General Literature 111, Poetry 22, Religious Literature 12, Fiction 102, Miscellaneous 30. Total 368.

Receipts, including government grant, $635.71 ; expenditure $625 71 ; balance on hand $10.00.

5. *Ottawa Field Naturalists' Club.*—The Report of the Ottawa Field Naturalists' Club for the year ending 30th April, 1901, shows that the Club has 250 Members, and still continues its practical field work. On Saturday afternoons five sub-excursions to places adjacent to the City, and three general excursions were held ; these were each attended by from one hundred to two hundred and fifty members and friends.

Programme of Winter Soirees.

(1) Opening Conversazione.—Exhibition of Specimens, President's address (Dr. Ami), Presentation of a portrait of the late E Billings, The Forest of Canada, with lantern illustrations, Dr. Robert Bell, F R.S

Six Meetings were held for conversation, exhibition of specimens, and reading of papers, as follows :—

(2) Rocky Mountains, with reference to the Crow's Nest Pass, Prof. John Macoun. Observations on the Crow's Nest Pass, Jas. McEvoy, B. Sc —Report of the Botanical Branch.

(3) Exploration in Baffin Land, lantern illustrations, Dr. Robert Bell, F.R S. The Arboretum and Botanic Garden at the Central Experimental Farm, Ottawa, W. T. Macoun.—Report of the Geological Branch.

(4) Ancient Channels of the Ottawa River, Dr. R. W. Ellis, F.R S.C. The Algonquin Park, A. M. Campbell. The Autumn-flowering of native plants, C. Guillet. Mosquitoes, Dr. J. Fletcher.—Report of the Ornithological Branch.

(5) The region between the Nelson and Churchill Rivers, D. B. Dowling, B.Sc. Prehistoric Camping Grounds along the Ottawa River, T. W. E Sowter. Recent discoveries in the Utica formation at Ottawa, Dr H. M. Ami.

(6) Fat in the Animal body,—its functions and origin, A. T. Charron, B A. Trees and shrubs for the adornment of parks and streets, Dr. W. Saunders.—Report of the Entomological Branch.

(7) Sources and distribution of the gold-bearing alluvions of the Province of Quebec, Robert Chambers. Corundum, in Ontario, Dr. E. A. Barlow.

Volume XIX of the Ottawa *Naturalist* has been completed ; it has several illustrations and interesting articles on Botany, agricultural chemistry, conchology, entomology, geology, ornithology, palaeontology. zoology, etc.

Receipts, including government grant, $692 70 ; expenditure, $436.24 ; balance on hand, $256.46.

6. *Ottawa University Scientific Society.*—The Report of this Society shows that this has been a very successful year; the membership has greatly increased, and 79 scientific books have been purchased for their library.

Lectures were given by Sir James Grant, M.D., on preservation of health, and by Professor Prince, on living marvels of the Sea

Receipts, including government grant, $145.60; expenditure, $187.32; deficit, $41.72.

7. *Toronto Astronomical Society.*—This Society is doing excellent practical work; twenty three meetings were held for reading and discussing papers, etc. For want of space we refer briefly to eight meetings only at which papers on the following subjects were read. (A full description of all the meetings can be found in the Transactions of the Society, recently published)

(1) Astronomy in infancy, growth, and maturity, A. Harvey, F R S.C.

(2) The Chromoscope, D. J. Howell.—Liquid Air illustrated, J. E. Maybee, C.E.

(3) The approaching total Solar Eclipse of May 28th, T. Lindsay.

(4) Mercury, Venus, and the Zodiacal Light, Rev. R. Atkinson, A. F. Miller and Andrew Elvins.

(5) Solar observations by projection, F. L Blake and G G. Pursey. Variations in the brilliancy of Venus, T. Lindsay.

(6) Reports of the occultation of Saturn, March 24th, Dr. J. J. Wadsworth. Recent planetary work done at the Lowell Observatory, Mrs. A G. Savigny. The work of Sir William and Lady Huggins in the field of spectroscopy, A. F. Miller. Construction of planispheres, J. E. Maybee, C.E.

(7) Eclipse as seen from the sun, A. Elvins. Eclipse as seen from Venus, G. E. Lumsden, President. Eclipse as seen from the moon, Rev. R Atkinson. Searches for intra-Mercurial Planets during Eclipses, J. B. Musson. What Professional Astronomers hope to discover, J. R. Collins. Examination of solar prominences during eclipses, A. F. Miller

(8) Standing or stationary light waves, C. A. Chant, B.A.

Receipts, including Government grant, $417.28; expenditure, $268 08; balance on hand $149.20.

8. *Canadian Institute, Toronto.*—The Report of the Canadian Institute for the year ending 30th April, 1901, shows that twenty-one general meetings were held, at which thirty papers were read. These may be classified as follows: President's address, Fish Life (4), Geology (1), Forestry (3), Biology (2), Ethnology (1), Topography (1), Meteorology (1), History (1), Color photography (1), Exploration (3), Literature (3), Industrial chemistry (2), Decimals (1), Biography (1), Miscellaneous (5).

The Biological Section had thirteen meetings, at which papers were read as follows:— 1. Trogon Family. 2. Notes of a holiday at Niagara. 3. Starches. 4. Parasites. 5. Two specimens of foreign pigeons. 6. Shells (genus unio). 7. Classification of Insects. 8. The Emoeba and its relations 9. Classification of Birds. 10 Bacteria. 11. Game Birds. 12. A young collector's experience in England. 13. Fresh water Sponges.

Several outings were held during the summer which were largely attended by the members and their friends of this section.

The report of the Librarian shows that this Institution during the past year exchanged publications with about 500 scientific and learned societies The number of exchanges received was 2,303, and the number of donations 106. The total number of publications received through donations, purchase and exchange is 3,297. The number of books and periodicals taken out during the year was 1,138

Receipts, including government grant, was $4,025.60; expenditure $4,025.60.

9. *Ontario Historical Society*—The report of the Ontario Historical Society for the year ending 30th May, 1901, shows that the membership has greatly increased in the following affiliated societies, viz:

Belleville and Bay of Quinte Historical Society, Elgin Historical Society, Halton Historical Society, Lambton Historical Society, Lundy's Lane Historical Society, Niagara

Historical Society, Oxford Historical Society, Perth Historical Society, Simcoe Pioneer and Historical Society, Women's Canadian Historical Society of Toronto, Women's Canadian Society of Ottawa, Women's Wentworth Historical Society, Wentworth Pioneer and Historical Society, Thorold and Beaverdam's Historical Society, York Pioneer and Historical Society, Norfolk County Historical Society, Victoria County Historical Society, Town and County of Peterborough Historical Society, Prince Edward County Historical Society.

Galinee's Journal with map will be issued in a short time. The translation has been made by the President, Mr J. H. Coyne. The volume is now in press.

Local societies are in course of being organized in Durham, Bruce and Middlesex counties.

APPENDIX H—*DEPARTMENTAL LIBRARY, ETC, 1901.*

Report of the Librarian of the Education Department for the Year 1901.

To the Honourable Richard Harcourt, M.A., K.C., Minister of Education, for the Province of Ontario:

PART I.—THE EDUCATION LIBRARY.

I.—The Library of the Department and its Functions.

Although not a general Library, in the ordinary acceptation of that term, yet the Departmental Library has a fair average collection of miscellaneous Books in General Literature and History. Its special function, however, is to provide an abundant supply of such books on educational subjects as are in constant demand by the Students of the Normal School, and, to a certain extent, books of reference for the use of Masters of Public Schools, High Schools and Collegiate Institutes, as well as of Public School Inspectors and University Students, etc.

The special subjects, in regard to which the Library is well supplied with Books "up-to date," are the following:—

Kindergarten and Kindred Subjects;
School Boys and Girls and their Education;
Human Knowledge—Pursuit of it and Self Education;
Juvenile Education—As well as Crime and Punishment;
General Education—School Management and Methods;
Physchology and Kindred Subjects;
Conduct, Character and Self-Help;
Noted Educationists and Educators:
Women,—their Education, Duties, Etcetera;
Temperance, Hygiene and Health;
General Science, Chemistry, Mathematics, Etcetera;
Physiology and Kindred Subjects;
Physical Education,—Gymnastics and Calisthenics;
Natural History.—Various Departments;
Astronomy and Kindred Sciences;
The English Language,—Words, Etcetera;
General English Literature;
Miscellaneous Literature, Etcetera;
School House Architecture and Arrangements;
Education in Ontario and Other Canadian Provinces;
Education in Great Britain and Ireland;
Education in the Various British Possessions
Education on the Continent of Europe;
Education in other Countries;
Industrial Education in Various Countries;
Education in the United States, (five divisions):
Roman Catholic Education and the Christian Brothers;
Sunday Schools and Religious Education;

Geography and Description of Various Countries;
Dictionaries and Books of Reference;—Various;
Educational and Literary Biography;
Miscellaneous Biography, English, Scotch, Irish,
French, German, Italian and American Biography, Etcetera;
Female Biography;
General and Miscellaneous History;
Political Economy, Philosophy and Kindred Subjects;
Rhetoric, Elocution. Reading, Composition, Etcetera;
Logic and Reasoning;
Miscellaneous Stories of Practical Life, Etcetera;
Magazines, Reviews and other Periodicals;

II.—Catalogue of Books Relating to Education, Etcetera.

The whole of the Boooks in the Library, on the foregoing Subjects, have been arranged and classified, and their titles have been systematically given in subdivisions, for easy reference, in a Departmental Catalogue, extending to 268 pages. This Catalogue was published in 1897, and is available to all parties, who are entitled, or who may desire to obtain Books from the Library.

III.—The Ordinary Business Operations of the Library.

The ordinary duties devolving upon the Librarian and his Assistant, are:

1. The giving out, for a prescribed time, of Books on Teaching. Education and Kindred subjects, which form the topics of Instruction in the Normal and Model Schools, directly connected with the Department here in Toronto. These Books are loaned to Students of the Normal School, and to the Masters and Special Teachers. To other persons who make special requests for particular Books, they are also loaned on similar terms as provided for in the Official Regulations for the government of the Library.

2 A record of each Book, thus given out, is made in a Register, prepared for that purpose, in which the parties borrowing sign their names in the form of a receipt, and as a guarantee that they will return the book in a given time, and in good order. In case of damage, the Book is either paid for, or a new one is given in its place.

IV.—Duplicate Books sent to Form or Replenish the Libraries of the Normal College and the Normal School at London.

As assented to by you, a large number of duplicate Books, which had accumulated in our Library, were sent last June to the Library of the Normal College at Hamilton and to that of the new Normal School at London. Some years ago, quite a variety of Works on Education and General Literature was sent to the Normal and Model Schools at Ottawa.

V.—Yearly Record of Books Loaned to Students and Others.

Given out in month of	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
January	159	334	375	354	573	699	608	484	526	518
February	431	764	669	804	1,040	1,370	928	868	948	1,124
March	617	944	585	1,034	1,270	1,702	1,393	1,158	1,454	1,563
April	467	897	990	627	1,021	1,111	882	848	766	997
May	546	814	694	633	843	923	969	895	911	867
June	332	461	332	354	400	609	677	518	540	576
July	69	54	47	223	32	254	265	256	231	317
August	100	97	48	100	16	184	233	329	224	176
September	526	370	344	415	295	514	410	489	432	411
October	1,263	1,148	1,010	1,130	1,170	1,200	1,043	1,018	1,312	1,058
November	1,136	1,004	1,039	1,063	1,268	1,099	1,024	1,034	1,229	1,014
December	693	559	540	597	752	704	464	549	547	516
	6,339	7,446	6,614	7,334	8,680	10,369	8,896	8,447	9,120	9,137

VI.—Number and Subjects of the Books Purchased in the Years 1892-1901.

Year.	Volumes.	Subjects.
1892	388	
1893	290	
1894	257	
1895	430	Education.
1896	495	Science.
1897	476	Literature.
1898	533	Text Books.
1899	315	Miscellaneous.
1900	275	
1901	148	

VII.—The Number of Books Purchased in 1900-1901 was as Follows:

Subjects.	Volumes.	
	1900.	1901.
Pedagogy	23	29
Science (Political Economy, Anthropology, etc.)	24	8
Philosophy and Ethics	5	12
Industrial and Domestic Science	23	2
Poetry	18	1
Fiction, or Practical Life	26	5
Literature	78	3
Text Books	65	32
Miscellaneous (History, Biography, Reference Books)	13	72
Totals	275	164

VIII.—Number of Books Donated to the Library in 1898-1901.

——	1898.	1899.	1900.	1901.
Text Books	49	74	65	111
Miscellaneous			7	13
Totals	49	74	72	124

IX.—Newspapers and Magazines Received in the Years 1898-1901

Number of daily and weekly newspapers received in			1898	86
"	"	"	1899	83
"	"	"	1900	86
"	"	"	1901	91
"	magazines and other periodicals	"	1900	100
"	"	"	1901	102

X.—Books Magazines, etc., Bound During the Years 1892-1901.

1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
79	109	136	141	98	99	90	94	37	83

XI. Official Reports on Education in Different Countries received during 1896-1901

—	1896.	1897.	1898.	1899	1900.	1901.
From Great Britain and Ireland	28	36	16	23	34	26
Various Provinces of the Dominion	29	64	61	53	22	42
Australasia :						
Victoria	2	1		1	1	
New South Wales		1	1	1	1	1
South Australia				1	1	
Western Australia	1	1	4	1	1	1
Queensland	1	1	1			1
Tasmania	1	2	1	1		1
New Zealand	13	2	1	14	8	9
Other British possessions :						
Mauritius	1				2	
Cape of Good Hope	1	1	1	1		1
Natal	1				1	1
Jamaica	2	2	1	1		2
Barbados		1			1	1
British Guiana	1	1	1	1	1	1
Strait Settlement						1
Various States of the American Union	36	47	53	81	47	117
Miscellaneous :						
Brazil					2	
Buenes Ayres	10		10	12		
Montevideo	11		6	8		
Costa Rica	5	1	2	3	4	
France	3	8	1	21	10	
Germany			1	5	1	
Portugal				1		
Switzerland		3		2	2	4
Japan	1	1	1	2	1	1
Hawaii			1			
Argentine Republic		13	2		13	16
Venezuela	1					
Uruguay		13			1	1
Chili					1	
Sweden						1
Italy						19
Germany						1
Totals	148	199	165	238	155	247

XII. Miscellaneous Pamphlets received in 1901.

From various Countries	80	
From Provinces of the Dominion of Canada	28	
		108

XIII. Various Catalogues of Historical and other Rare Books

I can add no hing to what I said last year, as to the desirability of printing the interesting and valuable manuscript Catalogues, which have been prepared with that view. In my last year's Report on this subject, I said :—

"1. *Education.*—The catalogue of books relating to various subjects of Education and kindred subjects for the use of students, teachers and others has been reprinted. The

present catalogue is a reprint, with large additions, of a catalogue of a more contracted character, printed in 1886.

"2 *History of Canada.*—A supplement of the catalogue of our very extensive variety of books on the Dominion of Canada and its various Provinces, printed in 1890, was partly revised in 1899, and can be completed at any time for reprinting, when so desired. The various Historical Societies avail themselves of this collection of historical books—the members of which express themselves greatly pleased with the extent and variety of books in the collection.

"3. *Miscellaneous.*—As stated in my report of 1896, we have Catalogues in manuscript of (1) books on the classics and kindred subjects, (2) of works of art, and (3) of a number of rare text books, dictionaries, etc., presented to the library by the Venerable Dr. Scadding, ex-Master of Upper Canada College.

"4. I would again recommend that the revised Catalogue of Books on the various Provinces of the Dominion be reprinted. At present, reference has to be made to the old Catalogue of 1890—since then we have very nearly doubled the number of Books on this most interesting subject—many of them, and especially of the new collection, of rare value. Of this older collection not less than fifty four volumes were printed before the beginning of the nineteenth century. The Canadian part of the Library is rich in poetry written by persons in the Dominion of Canada."

PART II.—HISTORIOGRAPHY.

I. Documentary History of Education in Upper Canada Volume VIII.

Volume VIII of this Documentary History I completed in 1901. It deals largely with matters connected with King's College in 1849,—the year by which, under Mr. Attorney General Baldwin's Bill, that College became the University of Toronto, its present designation. This volume also gives a summary of the initial proceedings of a Commission appointed by the Council of the University to inquire chiefly into the financial condition of the Institution. That Commission did not finish its labors until 1852; but the most important part of these labours was completed in 1849-50, so that I was enabled to give an extended summary of them in this Eighth volume.

The year 1849 was notable as marking an important crisis in the history of our Common School System. In that year, a Common School Bill, hostile to the Chief Superintendent of Education, and, in many important respects, defective, owing to omissions in its practical machinery, and contradictory in several of its provisions, was passed. Upon a full representation of the case to the Government of the day, the Bill, although concurred in by both branches of the Legislature and assented to by the Governor-General, was not permitted to go into operation.

In the preface prefixed to this Eighth Volume, I have thus referred to the University legislation of 1849:—"Events proved that this comprehensive University Bill of 1849 was, after all, a merely tentative measure; for, after it had become law Bill after Bill, to alter it, was introduced into the Legislature, and some of them were very favourably received—though not passed,—yet so many and diverse interpretations had been given to some of the provisions of the Baldwin Bill, after it had become law, that a "Declaratory Act had to be submitted to the Legislature during the following year, and passed, so as "to remove certain doubts respecting the intentions of the Act of 1849."

In regard to the abortive School legislation of 1849, I said:—"Practically, the episode of the abortive School legislation of 1849, and the singular proceedings of the Toronto City Council, which led to the closing of the City Schools in 1848, as well as the less pronounced, yet no less hostile proceedings of other Municipal Councils against the principle of supporting the Schools by taxation, had an educationally good effect. It led to a thorough and largely exhaustive discussion in the newspapers, and, by circular from the Honourable Inspector General Hincks, (the Educational Representative of the Government,) inviting the individual views of educationists of all shades of opinions, so as to enable the Chief Superintendent to incorporate, in a proposed School Bill, such suggestions as might appear to him to be both wise and expedient. As a result, the notable School Act of 1850 was thus projected: and it has ever since been justly considered as the Charter of our Public School System."

II. Documentary Histories of Education in Other Countries.

For want, no doubt, of information on the subject, some parties in Ontario have expressed themselves as not in favour of educational historical investigation in the manner authorized by the Government of this Province. I therefore, in the course of the year, corresponded with the various Historical Societies in the United States, (and the older ones in Canada,) on the subject. I have received a number of replies from State, and other Historical Societies in the adjoining Republic. "Although," (as stated in the Preface to the Eighth Volume, to which I have referred,) "some of these Societies are most generously subsidized, by state Governments and Legislatures* yet none of them have devoted any special attention to educational historical subjects, except in the way of biographical sketches of noted Educators or Educationists.

"It is, therefore, highly gratifying to know that, with the single exception of Germany, there is no Historical Society in the United States, or Canada, and no Government but our own that has given attention to the subject of educational history, or has provided for recording, in a permanent form, what their early educational pioneers have done; and, in such publications as this one, to gather up and preserve for future reference and guidance the varied educational facts and experiences of the past, so as to enable those who come after them to deal intelligently and satisfactorily with the social and educational problems, as they arise and seek solution."

The Hon. Dr. Harris, United States Commissioner of Education, in his Report for 1898-99, mentions two unique collections of Volumes—over a collection of four, and the other of nineteen Volumes,—of German Educational History of special interest.

In describing this parallel educational historical movement in Europe, Dr. Harris, in his Report, says:—

"Recently a German work on Educational History has made its appearance, following on independently a line of research in documentary sources, and thus commending itself to the student. It is a work bearing a Latin name, Monumenta Germania Pædagogica. Nineteen volumes have appeared up to April, 1900. Its object is to introduce the reader directly to the original historical sources. A statement of its contents will show what it offers:

"Volumes I and VIII present the Brunswick Governmental School Regulations and Decrees, which are the first important authoritative orders given for the establishment and regulation of Schools by Protestant Princes, and are, therefore, of paramount interest in showing how the Schools during the Reformation began to be severed from the church and how they became state institutions.

"Volumes II, V, IX, and XVI present the original "*Ratio Studiorum*," prescribed for the Schools of the Jesuits. In view of the fact, that, for more than a hundred years, the Schools of that Religious Order in Europe were the best seats of learning below the Universities, this publication is very welcome. It gives an insight into documents not easily available.

"Volume III contains the history of Mathematical Instruction in Germany during the Middle Ages.

"Volume IV contains the German Catechisms of the Bohemian and Moravian Brethren.

"Volumes VI and VIII contain the Regulations and Orders of the Saxon Schools in Siebenburgen, (in Hungary).

"Volume VII presents a biography, based on documentary evidences of Luther's friend, the Reformer, Philip Melancthon, whom contemporary historians called: Preceptor Germania

"Volume XII contains the Doctrinale of Alexander de Villa Dei.

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*The Historical Society of Wisconsin received a yearly grant from the State of $20,000 and other subsidies. The Secretary says: "Although we now cost the State $30,000 per year." The Minnesota Historical Society gets a grant of $11,000 a year from the State. The Society of New Jersey receives about $3,000 a year for publishing the State Archives. The cost of these Archives up to date has been $50,000. The Rhode Island Society receives a grant of $1,500 a year.

The New Brunswick Society only receives $125 a year. The Nova Scotia Society receives nothing.

The Documentary History of the Civil War in the United States has just been completed in 127 Volumes,—averaging 1,000 pages each,—at a cost of $3,000,000. It has a copious index, plans, maps and engravings. Nearly every public library has been supplied with a copy.

"Volume XIV contains the history of education in Bavaria, and Volume XIX, that of the Bavarian Palatinate.

"Volumes X, XI, XV, XVII, and XVII give an account of the history of Military Education, during the last centuries. This last work reaches up to the year 1896, and is, therefore, quite complete. Further volumes will appear in time, as the publication of this valuable undertaking has been secured by a subsidy from the Imperial Exchequer, by a vote of the Reichstag, likewise by substantial aid promised by the Prussian Department of Public Education and learned societies, as well as the National Teacher's Association. The publication proceeds rather slowly,—about two Volumes a year,—but, in the interest of thorough scholarship, this may, perhaps, be best."

A writer in the Commissioner's Report thus points out the destination between the two methods of dealing with the History of Education,—the second of which I have invariably followed. He says:—

"Among the methods of presenting the history of education, there are two distinct, if not antagonistic ones; the one deals exclusively, or chiefly, with the theories and plans of reform, which in the course of centuries have been advanced by philosophers, and in turn have agitated the educational world. . . .

"The other method is the one, which exclusively deals with facts gleaned from documentary sources from Governmental Decrees, and from School Programmes and Chronicles, and thus presents, or attempts to present, actual conditions. It is "*Quellenstudium*," study of original sources, which is emphasized by modern scholars generally. It is the method advocated in particular by modern historians, and is in accordance with the methods applied in teaching and studying natural history and science. This mode of procedure,—the study of historical sources,—has taken hold of educational, as it has of theological students."

In some respects the elaborate and invaluable systematized Reports, issued from time to time, by the able United States Commissioner of Education at Washington, may be considered as a somewhat condensed and composite annual History of Education in all civilized Countries It must, necessarily, in regard to special local educational history, be brief and general and, to a certain extent, fragmentary, while our Documentary History deals fully with the subject and is chronologically consecutive.

Quite recently, the English Department of Education has adopted the United States System of issuing Annual Volumes on general and specific educational topics rather than, as a rule, historical accounts of Education in various Countries.

Should a Dominion Bureau of Education be established, as suggested to Sir John Macdonald by Doctor Ryerson at Confederation in 1867, the United States and latterly the English, System, of issuing detailed accounts and abridged sketches of Education in the various Provinces, and other places, would likely be adopted, and an effort would doubtless then be made of seeking to harmonize our Canadian systems of education, without, in any wise, interfering with the local administration of education in the several Provinces and Territories.

PART III.—SCHOOL ROOM DECORATION.

Since writing this part of my Report of last year, I have procured some additional illustrations for a proposed publication, under the authority of the Department, on School Room Decoration on a more extended scale than that in the Brochure on the subject, of twenty six pages, which was prepared by me and published by the Department last year.

The following is a list of the illustrations now available for such a publication. Among these illustrations is a photograph of the Statue of Sir John Colborne, (Lord Seaton,) founder of Upper Canada College, erected near the Devonport Dockyard, close to Plymouth. Not being able to procure a photographic copy of this Statue while in England in 1898, I got a friend there to take the matter in hand. His report to me on the subject is as follows:—

"I could not obtain a view of Lord Seaton's Statue, as it is not illustrated in any of the published works on Plymouth. The cause is,—that the Statue is on Government property; and no one is allowed to take photographs there, for military reasons. Mount Wise, on which the Statue is erected, is a fortified military position of great importance at Devonport, (close to Plymouth.) At length, after some inquiries, I obtained the assist-

ance of a gentleman, and he appealed to the Commander-in-Chief of the Western District,—Sir William Butler, formerly in command in South Africa. He was very courteous; and, after full explanations, as to the purpose and object of the request, and as to yourself, he consented to have the Statue photographed under military supervision." . . .

The photographs and other illustrations for a further publication, as suggested, on School Room Decoration, which are now available, are as follows —

1. The Champlain Monument, Quebec.
2. Wolfe's Monument on the Plains of Abraham, Quebec.
3. Wolfe and Montcalm Monument, Quebec.
4. Monument to the "First Missionary," near Quebec.
5. Monument Aux Baves, Ste. Foye.
6. Emigrants' Monument, below Quebec.
7. The Maisonneuve Monument, Montreal.
8. The Macdonald Monument, Montreal.
9. The Queen's Statue, Royal Victoria Hospital, Montreal.
10. The Queen's Statue, Victoria Square, Montreal.
11. Sir George Cartier's Statue, Ottawa.
12. Sir John Macdonald's Statue, Ottawa.
13. The Mackenzie Statue, Ottawa.
14. The Volunteer Monument, Toronto.
15. Sir John Macdonald's Statue, Toronto.
16. The George Brown Statue, Toronto.
17. Rev. Dr. Ryerson's Statue, Toronto.
18. The North West Volunteers' Monument, Toronto.
19. The Guards' Monument, Ottawa.
20. The Volunteers' Monument, Winnipeg.
21. The Williams Statue, Port Hope.
22. The Brant Monument, Brantford.
23. The Brant Statue, Brantford.
24. The Lundy's Lane Monument.
25. The Chrysaller's Farm Monument.
26 The Beaver Dam's Monument.
27. The Laura Secord Crossing.
28. Brock's Monument, Queenston.
29 Brock's Cenataph, near Queenston.
30 The South African Volunteers Monument, City Hall, Toronto.
31. Lord Seaton—Sir John Colborne's Statue,—Plymouth, England.
32. The Grosse Ile Monument, below Quebec.
33. The Marquette Monument, Washington and in Wisconsin.
34. Pere Allouez Monument, Wisconsin.
35 The Crimean Monument, Halifax.
36. The Tabaret Statue, Ottawa.
37. The Macdonald Statue, Kingston.
38. The Macdonald Statue, Hamilton.
39. The Gordon Statue-Monument, Chatham, England.
40. The Lord Clyde Statue (Sir Colin Campbell), London, England.
41. The Guards' Monument, London, England.
42. The Nova Scotia Volunteers in South Africa.
42 The Bust of Rev. Dr. Ryerson, by Rosen in 1854.

In addition, there is a selection of likenesses of noted North-West Indians of the Tribes in Canada.

As intimated in my Report on this subject last year, a selection of pictures from noted English historical works can be made, illustrative of memorable incidents in British and Irish history.

These varied illustrations, if published in half-tone pictures and in a convenient form, as I suggested to you last May, would show our School Boards, Inspectors and School Masters, what abundant historical material we have available for the decoration of the School Rooms in Ontario. The movement in this direction has from time to time

been actively promoted in the United States, and at the present time is very spiritedly taken up in England.

I may here remark that two very striking coloured pictures of: (1) "Discovery of Lake Champlain" and (2) the "Battle of Queenston Heights"—prepared by Mr. J. D. Kelly, of this city, have been published, as Supplements, of "*Saturday Night*" periodical, Toronto. They are 21 by 31 inches in size, and would prove to be admirable pictures for the School Rooms.

J. GEORGE HODGINS,

Librarian and Historiographer of the Education Department of Ontario.

Toronto, 3rd of December, 1901.

REPORT

OF THE

MINISTER OF EDUCATION,

PROVINCE OF ONTARIO,

FOR THE YEAR 1901.

PART II.

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TABLE OF CONTENTS.

PART II.

APPENDIX I.—COUNTY MODEL SCHOOLS. PAGE

1. Report by J. J. Tilley, Inspector 161
2. Statistics of County Model Schools, 1901 170

APPENDIX J.—PROVINCIAL NORMAL AND MODEL SCHOOLS.

I. Provincial Normal and Model Schools, Toronto 174
1. Staff of Toronto Normal School; students admitted 174
2. Staff of Provincial Model School, Toronto; number of pupils 174
3. Report of Principal Scott 174

II. Provincial Normal and Model Schools, Ottawa 176
1. Staff of Ottawa Normal School; students admitted 176
2. Staff of Provincial Model School, Ottawa; number of pupils 177
3. Report of Dr. John A. McCabe, Principal 177

III. Provincial Normal School, London 180
1. Staff; students admitted 180
2. Report of Principal Merchant 181

APPENDIX K.—ONTARIO NORMAL COLLEGE.

Report of Dr. J. A. McLellan, Principal 186
Staff, and students admitted 186

APPENDIX L.—THE ONTARIO LIBRARY ASSOCIATION.

Minutes of Proceedings 193

APPENDIX M.

Report on Public Libraries, visited by Dr. S. P. May, in New York, Philadelphia and Buffalo 195

APPENDIX N.

Report on Art Schools, Drawing in Public Schools, etc., visited by Dr. S. P. May, in New York, Philadelphia, and Buffalo 198

APPENDIX O.—MACDONALD MANUAL TRAINING SCHOOLS.

Report of the Director 203

Appendix P.—School of Practical Science; University of Toronto; University College. PAGE

1. Annual Report of the School of Practical Science, 1901 206
2. Annual Report of the University of Toronto, 1900-1901 209
3. Annual Report of University College, 1900-1901 212

Appendix Q.—Superannuated Teachers, 1901.

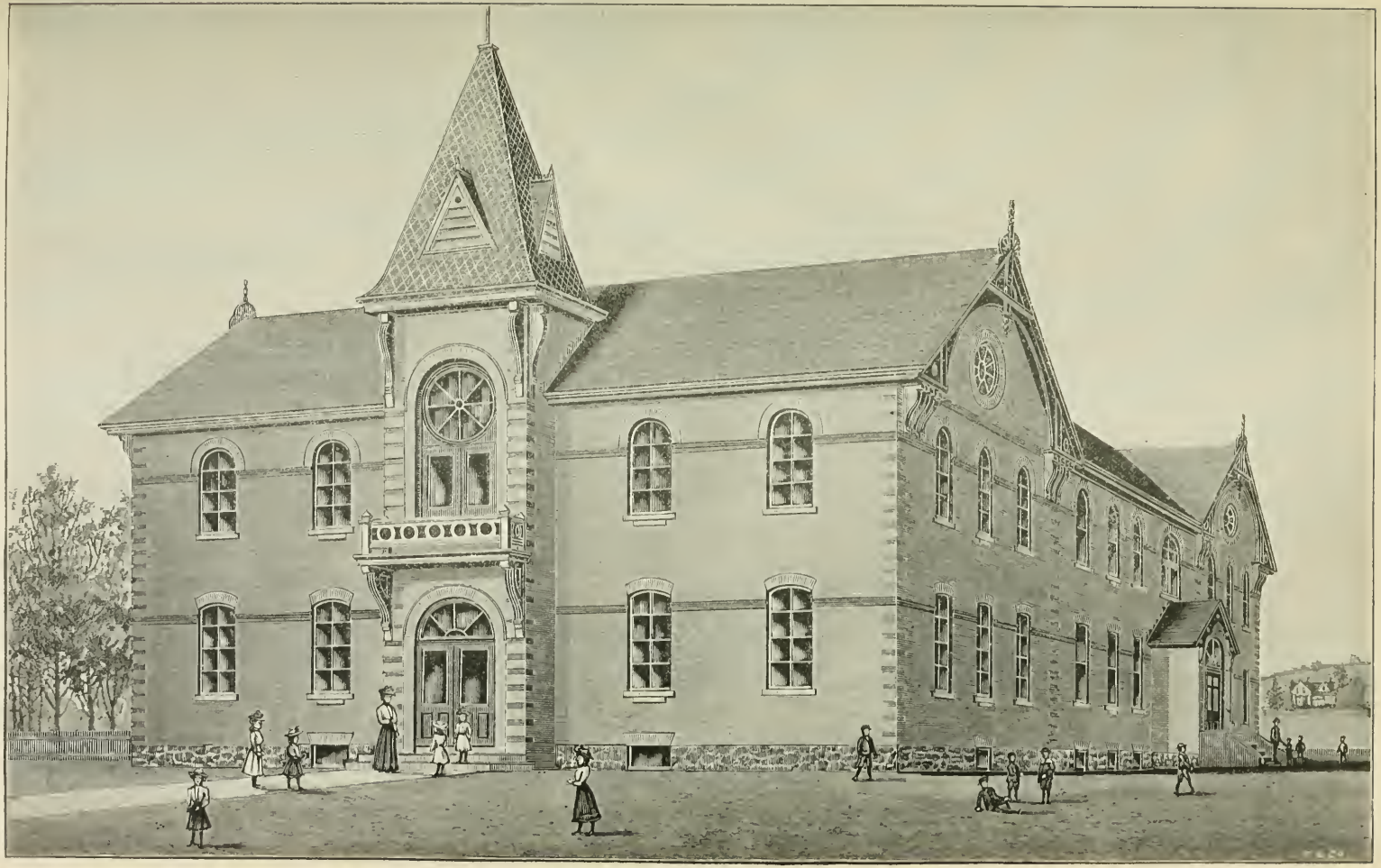
1. Allowance granted during 1901 214
2. Summary for years 1882-1901 214

Appendix R.—Certificates, Etc., 1901.

1. Inspectors' Certificates 215
2. Certificates—High School Principals and Specialists 215
3. do —High School Assistants and Specialists 216
4. Summary of Public School Teachers' Certificates 216
5. List of Provincial Certificates issued by the Department 216
6. Kindergarten Certificates 223
7. Domestic Science Certificates 224
8. Temporary and Extended Certificates 225
9. Professional Examinations 225

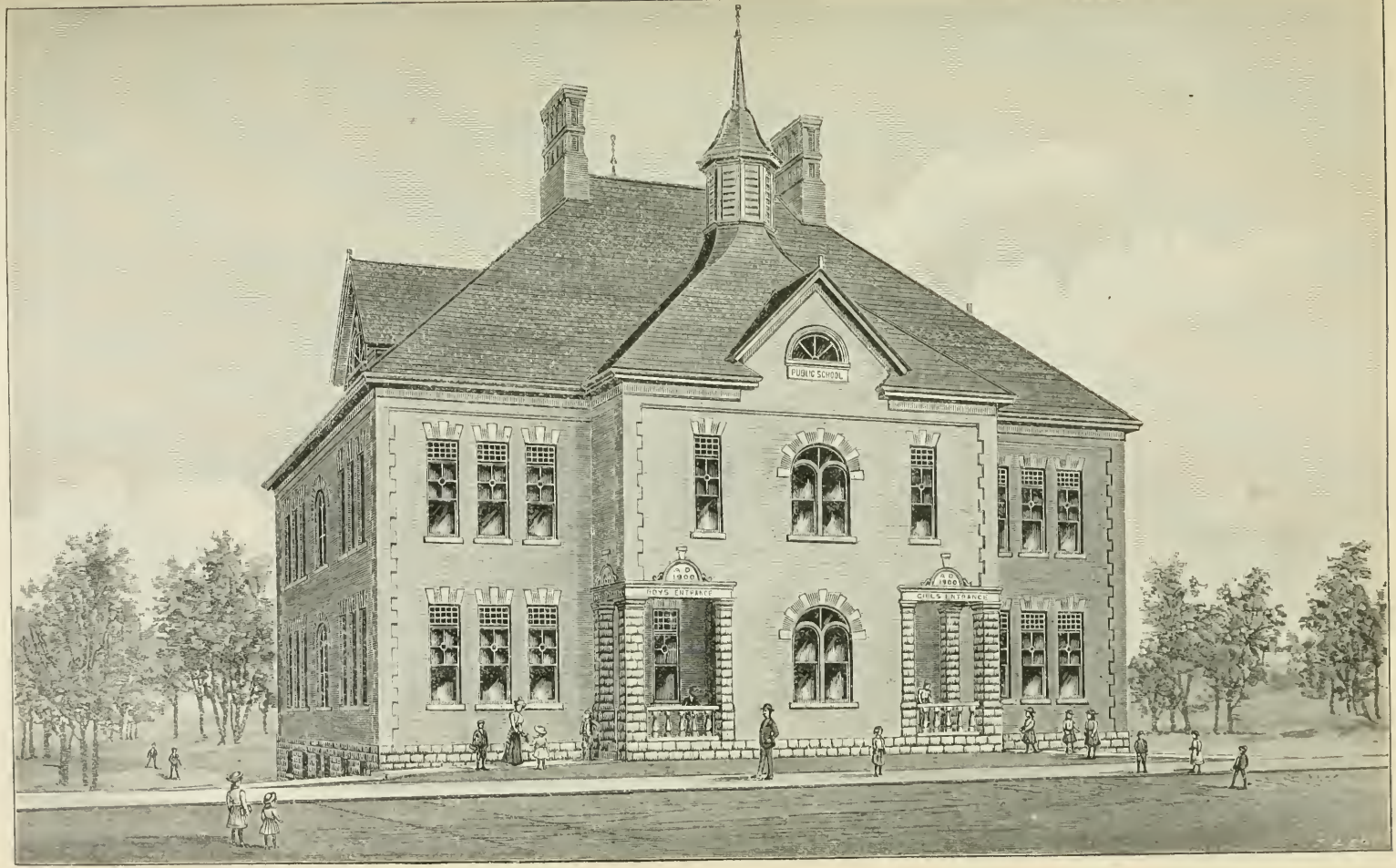
Appendix S.—Members of the Educational Council, and Boards of Examiners; Lists of Associate Examiners, and High School Principals and Assistants.

1. Members of the Educational Council, 1901-1902 225
2. Boards of Examiners for 1901 226
3. Associate Examiners, 1901 228
4. Principals and Assistants of Collegiate Institutes and High Schools, 1902 234



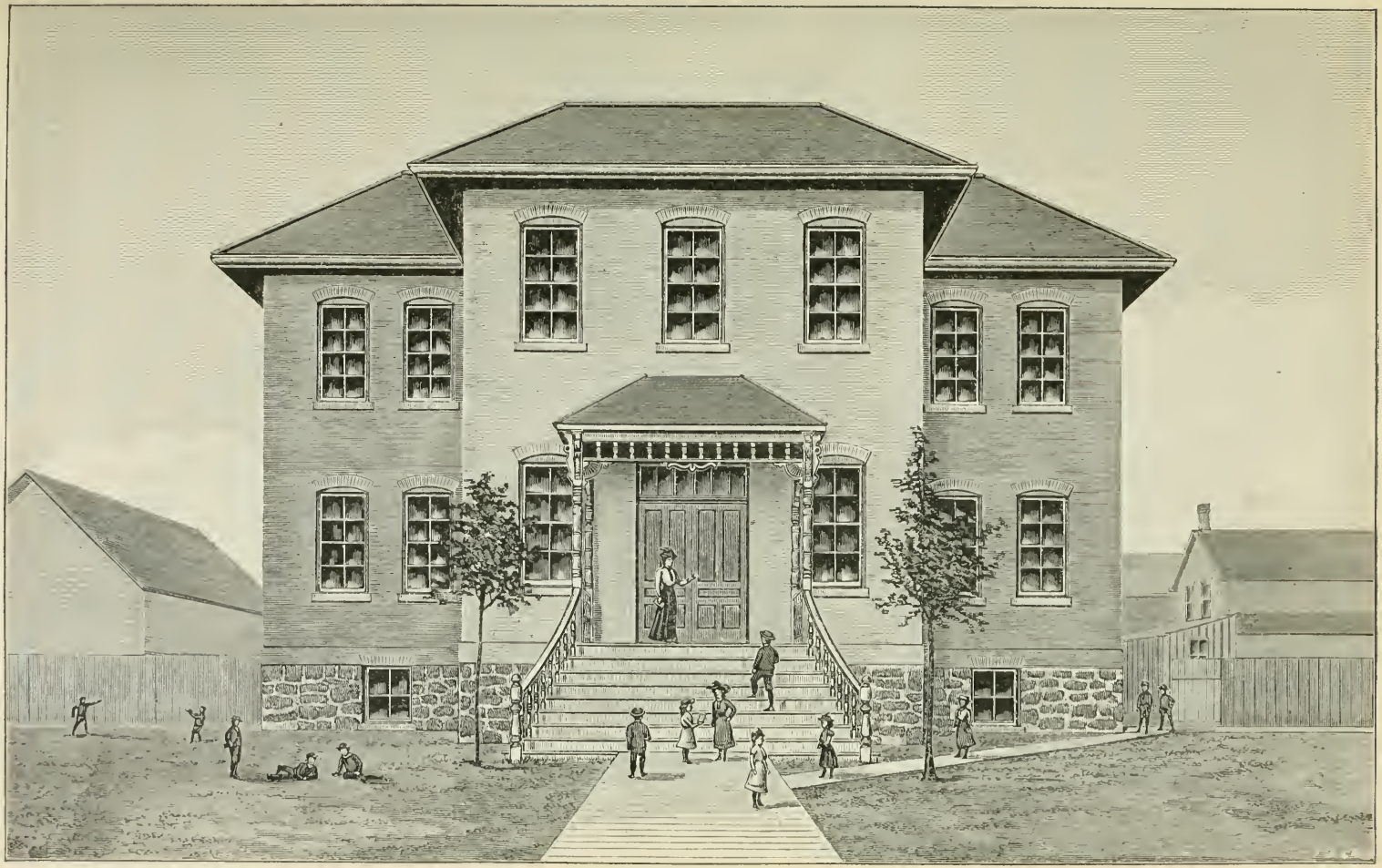
PUBLIC SCHOOL.
TOWN OF PORT ARTHUR.

DOMESTIC SCIENCE ROOM.
NORMAL SCHOL, LONDON.

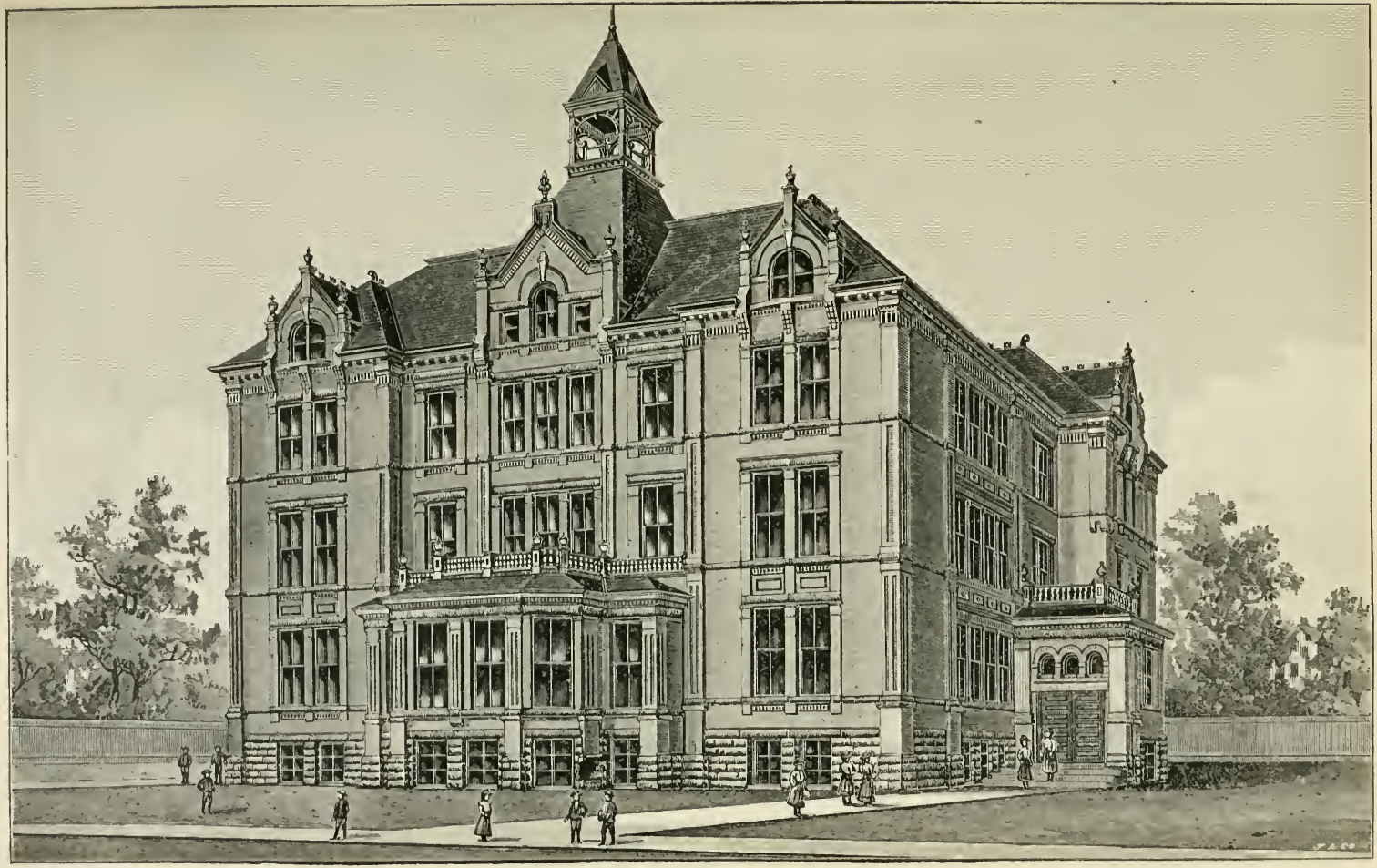


PUBLIC SCHOOL.

TOWN OF BLENHEIM.



PUBLIC SCHOOL AND HIGH SCHOOL ANNEX.
TOWN OF NORTH BAY.



PUBLIC SCHOOL.
WINCHESTER STREET, TORONTO.

REPORT

OF THE

MINISTER OF EDUCATION

FOR THE YEAR 1901.

PART II.

APPENDIX I.—*COUNTY MODEL SCHOOLS.*

REPORT BY J. J. TILLEY ESQ., INSPECTOR.

Although the present and future of County Model Schools are of greater interest than the past, a brief statement of the circumstances under which these schools were established will not be out of place.

Previous to 1877 the course of training in the Normal Schools was both academic and professional; and as attendance was not compulsory, the majority of teachers obtained their certificates from County Boards, which had power to issue all grades of certificates valid in the counties for which they were given.

In the year just mentioned there were 6,468 public school teachers in Ontario, and of these only 1,084 had ever attended a normal school. That is 83 per cent. of the teachers then employed had received no professional training whatever.

The Minister of Education, the late Hon. Adam Crooks, believed that the time had come when an important advance should be made, and required that all those who intended to teach should have some professional training.

To make provision for this through the additional normal schools that would be required was a formidable task, as I shall show later on, and one which he did not feel warranted in recommending the Government to assume. Instead of this being done, one or two of the principal public schools in each county were selected and conducted as County Model Schools under regulations of the Education Department.

The high estimate placed upon the services of teachers who had attended Normal Schools gave good grounds for believing that the proposition to furnish professional training for all teachers would meet with general favour, and the promptness with which Boards of Trustees accepted the scheme, and the readiness with which County Councils contributed to its support, fully justified the expectation.

These schools have been in existence for 25 years, and have furnished training for 31,000 teachers.

The term which was only 8 weeks at first has been extended from time to time, and is now 15 weeks; various improvements have been made to facilitate the training and the course has been broadened.

Thus what was a tentative measure at first has grown in public favour, and the service which it has rendered has been such as to justify its introduction and to warrant its continuance.

It will be well for us, however, to consider whether the time has not come when another advance should be made in the professional training of teachers, corresponding to the advance made in the non-professional training.

Model Schools are but one element in our school system and must be considered in relation to the whole. This unity was recognized in 1877, and both Normal and Model Schools were placed upon a professional basis. From that time until the present the academic training which had previously been furnished by the Normal Schools has been provided mainly by the High Schools, and through this division of the work the professional training has been very much extended.

In a pamphlet recently issued by a prominent educator, it is recommended (1) that Model Schools shall be abolished, (2) that High Schools shall be relieved from the non-professional training of teachers, in order that, *inter alia*, there may be an earlier introduction of the study of foreign languages by those who may wish to enter a university, and to relieve these schools from the so-called incubus of examinations, and (3) that the old teaching function of Normal Schools be restored, and that more Normal Schools be established, "if necessary". These recommendations involve radical changes, the effects of which should be carefully considered in advance. The use of the closing words in the quotation just given implies a doubt in the mind of the writer whether additional Normal Schools would be required or not. The simplest knowledge of the facts should preclude the existence of any such doubt. The number of certificated teachers employed in the Public and Separate Schools is about 9,000, and the average length of service of a teacher is doubtless less than 7 years. But if we place it at 9 years, then one-ninth of our teachers will retire each year, and 1,000 new teachers will be required annually to provide for what may be called the natural waste of the profession. For this reason training facilities must be furnished for at least 1,200 students per year, and this is quite below the average attendance in County Model Schools

If we take the London Normal School as the unit at least 8 additional Normal Schools would be required for this training, and in order that this number might suffice it would be necessary to complete the whole course in one year, which for the higher grades of certificates would be simply impossible.

The question of cost, though subordinate to efficiency, must be considered. The cost of the London Normal School, including grounds, building, and equipment was about $96,000, and this school is in no way beyond what is required. The cost of 8 such schools would therefore be not less than $768,000.

The annual cost of maintenance of the London Normal School is about $9,150 and if non-professional training were given, at least $3,000 more per year would be required for additional masters, which would increase the cost to $12,150, and the annual outlay for 8 such schools would be not less than $97,200. This is but $2,800 less than the whole amount of the annual legislative grant to the 130 High Schools and Collegiate Institutes in the province.

If Model Schools were abolished, and only professional training given in the Normal Schools, 8 additional schools would be required, for I assume that this training would not be less than that now given in the Model and Normal Schools, and therefore there could be but one session per year, and the annual cost of these additional schools would be at least $73,200

But apart from the question of cost, is it wise to assign the whole training of teachers to Normal Schools? The present system of training, including County Model Schools, was recommended by the late Prof. Young, and by the three gentlemen who were inspectors of High Schools at the time, viz., Dr. McLellan, Principal of the Normal College at Hamilton, the late Mr. Buchan, and the late Mr. Marling. These gentlemen were experienced teachers, and were thoroughly familiar with all phases of secondary education. This system was introduced 25 years ago, and it is but reasonable to assume that if it had been injurious to higher education, the present High School Inspectors, whose efficiency none will question, would long ere this have recommended its discontinuance, and that High School Masters and Boards of Trustees would have demanded the same. In neither case has this been done, and this fact warrants the belief that the present system of requiring High Schools to furnish the non-professional training for teachers is satisfactory to those directly connected with High Schools, and to the public.

The Ontario system has been adopted in Manitoba and in the N. W. Territories, and is being introduced into many parts of the United States In 1899 the committee on Normal Schools appointed by the National Education Association of the United States, which is undoubtedly the most important educational association in the world, reported unanimously in favor of requiring the completion of an advanced High School course as the condition for admission to Normal Schools.

We learn from this report that, "This type of school is most fully developed in Massachusetts, where only those students are admitted who are High School graduates from a four-years' course. In Pennsylvania preparatory classes are provided, but the State contributes only to professional training. In the Normal Schools situated in the Mississippi valley none but professional students are received, and in the States of the Pacific slope, the general opinion prevails that a full High School education should be the standard for admission to Normal Schools."

In addition to this it may be said that the State Normal College at Albany, N. Y., is a purely professional institution; and that in Chicago none but graduates of its own High Schools are admitted to the city Normal School.

In this report we also find the following statement with reference to the Middle States and the States of the Mississippi valley: "The tendency is to have one large and strong Normal School, and a number of schools of lower grade to prepare teachers for the elementary grades of Public Schools. In most of the States this tendency has not yet assumed actual form, but there is gradually growing a sentiment in favor of this kind of an organization, as the best for future adoption."

This is virtually what our Normal and Model School system is to-day, and it shows conclusively that Ontario in putting her Normal Schools upon a professional basis and in establishing local training schools, led the advance, and that what we did 25 years ago is now being recommended and adopted by the most experienced educators on the continent. Surely it will not be wise for us who have been in the van to restore the old order of things which others are now discarding.

We should also consider what would be the probable effect upon High Schools if this change were made. It is not many years since these schools occupied a comparatively unimportant position in the country. They were regarded mainly as schools for the wealthy and their chief work was to prepare matriculants for the university or for the "learned professions." Boards of Trustees had no power to impose taxation directly or indirectly, and the schools depended for their support mainly upon government grants and fees.

During the past twenty-five years these schools, by broadening their courses of studies, have thoroughly demonstrated their usefulness and have grown immensely in public favour. They have been granted the right to demand immediate support from the municipalities in which they are situated and from their several counties; and I think it may be said that during this period the progress made by our High Schools has been greater than that made in any other department of our school-system.

From the last reports available we find that the expenditure for High Schools increased from $348,946 in 1883 to $722,238 in 1899, an increase of nearly 107 per cent. in 16 years. The attendance for the same period shows a corresponding increase, viz, from 11,843 to 22,460, or nearly 90 per cent., while the attendance in Public Schools for the same period shows a decrease of about 6 per cent.

A very striking proof of the service rendered by these schools to the whole community is furnished by the report which gives the different callings in life upon which their graduates enter. The number of graduates in 1899 was 6,067 and of these 467 entered the "learned professions." Agriculture received 944, mercantile life 1,449, the teaching profession 1,297 or 21⅓ per cent. of the whole, and 1,910 engaged in other callings.

These figures give a strong negative to the statement that "High Schools are chiefly an institution for the preparation of Public School Teachers," and show most conclusively that these schools provide secondary education for all classes in the community. And it is through this work that they have so strongly established themselves in public confidence.

It is true that large numbers of students take the Departmental examinations, but these are compulsory only for those who wish to teach or to matriculate in a university.

Examinations for this purpose cannot be abolished, and if they are divided into two parts it is simply for the convenience of those who write.

It should be borne in mind also that these examinations, though commonly known as "teachers'" examinations, are taken by many students who do not intend to teach, but who are seeking the certified standing which they afford. The Junior Leaving or Second Class certificate is accepted, *pro tanto*, by

(1) All Universities and Arts Colleges in Ontario;

(2) All Medical Schools and the Medical Council, the School of Pharmacy and the School of Dentistry in Ontario:

(3) McGill University and Colleges in Quebec, the Manitoba University and the N. W. Territories for teachers' certificates, the Maritime Provinces for medical registration, and the Board of Regents for the State of New York;

(4) All Arts Colleges in Ontario in connection with Theological Schools for matriculation in Divinity.

The wide commercial value of these examinations is thus shown, and this, without doubt, accounts to a considerable extent for the large numbers of students who write annually.

With these facts before us we may safely conclude that if the change were made as recommended, the existence of many High Schools would be imperilled and the efficiency of all impaired through loss of support. Attendance and fees would be reduced, local municipalities would soon object to the high taxation which they now bear for High School purposes, and County Councils would no longer raise an average of $1,043 for every High School in the Province, as at present. In the words of another it has been well said, "Let it be felt that University influence is to dominate, and the maintenance of High Schools is doomed."

Instead of doing anything which would circumscribe the influence of these schools or alienate them from public favour, we should aim rather to widen their sphere and to bring them more and more in touch with the people generally and with the spirit and needs of the age and of the country in which we live.

We need have no fear of so-called "over-education." There may be defective education; there may be one-sided education, but when properly understood, there can be no such thing as over-education.

At the present time, when competition in the individual walks in life and among nations is becoming keener every day, when science is being invoked on every hand and skilled labour becomes an economic necessity, and when our fair province seems to be entering upon a new era through the development of its varied resources of mine, forest and farm, we should aim in a truly liberal and patriotic spirit to develop to the highest possible degree the general intelligence of our people. Intelligence safeguards a nation.

At the election for President of the United States in 1896, a scheme for the free coinage of silver was presented as a panacea for the betterment of human condition, but the people of the New England States formed a solid breastwork for the defence of "sound money," as against what they regarded as financial heresy, and doubtless thereby saved the nation from widespread and disastrous financial disturbance. In this connection it must be remembered that New England was the pioneer home of "The Little Red School House," and was the district especially blessed by the labours of Horace Mann.

Increased intelligence also increases the productive capacity of a people.

The United States Commissioner of Education found some years ago that each child in Massachusetts received on an average seven years of schooling, while each child in the United States, as a whole, received but four and three-tenths years. The ratio was 70 to 43. He also found that for the same year the wealth-producing power of each man, woman and child in Massachusetts was 73 cents a day, while for the country as a whole it was only 40 cents—an excess of 33 cents a day.

Horace G. Wadlin, Chief of the Massachusetts Labour Bureau of Statistics, gives from the latest obtainable figures the average per capita production a day for the United States as 37 cents, but for Massachusetts, 66 cents. The ratio is 66 to 37, or an excess of 29 cents a day.

Dr. Hill, Secretary of the Massachusetts State Board of Education, commenting on these facts, says: "The lengths of schooling for Massachusetts, and for the country at large, have slightly increased since Dr. Harris' statement, but their ratio has not materi-

ally changed. Whether we take Dr. Harris' earlier showing, or Mr. Wadlin's later, the larger wealth-producing power accompanies the longer schooling, and the excess of the one follows very closely the excess of the other. Now this cannot all be a mere happening. If it is true that intelligence produces more than ignorance, then excess in wealth-producing power must hold some relation to excess in knowing and doing power. Consider for a momont what is involved in the showing that each person in Massachusetts has a daily wealth-producing power 29 cents in excess of the average for the nation at large. It means that for each person the average annual excess is $88.74. It means that the productive energy of Massachusetts yields nearly 200 million dollars a year more than it would yield if the per capita productive capacity of the State were no greater than the average throughout the country. This is twenty times the annual running expenses of the Public Schools."

In order, therefore, that as many as possible may share in the advantages which increased intelligence confers, the line of separation between Public and High Schools should be narrowed rather than broadened, and the latter, by taking up and extending the work begun in the former, will continue so to grow in public favor, that we may hope, ere long, they, like Public Schools, will be made free by statute to all who are prepared for admission.

Concluding that it would be unwise to withdraw the non-professional training of teachers from High Schools, we have to consider the relation of County Model Schools to professional training. Shall these schools be continued; and, if so, under what conditions? The average attendance in Model Schools during the past ten years has been 1,408, and although it has been somewhat less than this during the past two years, owing chiefly to the withdrawal of the Primary examination, yet experience shows that this decrease will be but temporary.

The number of Third Class teachers employed in the Public Schools in 1899 was 4,187; and the number of those holding First and Second Class certificates was 4,005, the remainder holding County Board or other certificates. During the past ten years there has been a slight gain in the number of First and Second Class teachers compared with those of the Third Class. The former has increased from 39 per cent. to 48 per cent.; and the latter has decreased from 54 per cent. to 50½ per cent. This small increase in the number of teachers with permanent certificates is, I believe, owing to the fact that, in apportioning the Legislative grants to Public Schools, no recognition is taken of the grade of certificate held by the teacher. If a special grant of even a small amount were given to all rural schools employing Second Class teachers, and an additional grant to those employing First Class teachers, I have no doubt that there would soon be a very marked increase in the number of teachers holding these higher grades of certificates.

As Third Class teachers constitute one-half of the teachers employed in our Public Schools, it is evident that Model Schools must be continued, unless we are prepared to meet the very large expense involved in providing the additional Normal Schools required. Under what conditions then shall these schools be continued?

The training given in County Model Schools has been very serviceable and has, I am sure, been highly appreciated, but if we desire these schools to give us better results, we must increase their facilities for so doing, for both teachers and students are now taxed to their utmost, and are required to undertake much more work than they can possibly do well.

The shortness of the term is the main defect in the Model School system, not only on account of the limited time allowed for the training, but also through the loss sustained by withdrawing the Principal from this work during half of the year. If the training of teachers were the regular work of the Principal, and not a mere incident, he could give to it his chief attention and there would be constant growth. In this, as in everything else, the best results can be achieved only by continuous work along one line.

If the term were increased to say eight months, a permanent teacher would be employed for the senior division, and the chief objection, indeed in many cases the only objection to Model Schools, viz., the employment of a substitute for the Principal's room, would then be removed. The Principal would have plenty of time to get his school into proper working order before the opening of the Model School term in September, and to arrange for all promotions after the close of the term in May or June. He could also

have an hour a day for general supervision, and would then be Principal in reality and not merely in name.

The revenue of a Model School through increased grants and fees, and through a decrease in the number of schools should be sufficient to provide for the salary of the Principal, for unless this be done it will be useless to speak of extending the term.

With the Bi-lingual Model School to be opened in Ottawa this year, there are fifty-seven Model schools in the Province, and taking twelve hundred as the number of students to be trained, we have only twenty-one students for each school. In a school with eight or ten divisions, and no Model School should have less, from thirty to thirty-five students can be trained. And it is found in practice that not more than three or four students can have the requisite practice-teaching in one division without unduly disturbing the regular work of the teacher.

With this allotment of students, thirty-five to forty schools would furnish training for twelve hundred students, and this is the number of schools we require at present. As the number of teachers with permanent certificates increases, the number of Model Schools may be further reduced, and after some years Third Class certificates may be no longer required.

The County Model Schools which still remain may then furnish the training for Second Class certificates, for the number of Senior Leaving or First Class candidates will have so increased by that time as to furnish ample work for the Normal Schools, and the Normal College will be enabled to devote all its energies to the purpose for which, I believe, it was established, viz., the preparation of university graduates for work in High Schools.

The continuance of the Model School system with an extended term and broadened course of training is feasible and presents no serious difficulties The advisability of this has been affirmed by resolution again and again at both county and provincial conventions, and has been announced as the policy of the Education Department. Even if an assistant were provided for each school, the annual cost would be less than one-third of the amount required if the training were furnished in Normal Schools.

It may be urged in objection that the increased cost to students would be greater that the present remuneration of teachers warrants, and that many young persons would thereby be prevented from entering the profession. The supply of teachers has been for years quite in excess of the demand, and the results have been a painful cutting down of salaries through excessive competition, and the forced withdrawal of many of our most efficient teachers. The extended course of training would doubtless obstruct the entrance of those who intend to teach only for a year or two, but this should be regarded as an argument in its favour. The salary of the teacher is unreasonably small and his tenure of office quite too limited, and anything which will tend to increase the one and to extend the other is a step in the right direction.

To compensate for the increased expense certificates might be made valid for five years instead of for three years, as at present, and the better qualifications with greater permanence would be appreciated by the people and would, I believe, secure better remuneration.

We have thus far been considering the feasibility of our training system. We must also consider it from the stand-point of duty. If the education of the rising generation is a public and not a private matter, and if the State takes charge of this education and makes its support by the people, and the attendance of pupils compulsory, its first duty is to make all necessary provision for furnishing a supply of properly trained teachers, in order that the best possible results may be achieved. Many proposals are made from time to time for the improvement of our schools, but the best way to improve the school is to improve the teacher, and to give him a proper appreciation of the duties which he assumes.

It is now recognized by all who have given thought to the problem of education, that the value of the teacher's work is not to be measured so much by the amount of instruction given, as by the extent to which the pupil's intellectual and moral powers are increased. The learning of certain facts and the formation of certain habits are only means to this greater end, the attainment of which depends far more upon the spirit in which the pupil is taught and disciplined than upon what he learns. It is, therefore, of first importance that the teacher should have high ideals of his work and such a sense of his re-

sponsibility as will make him thoughtful as to his methods and his personal influence. This view of teaching has never presented itself to the young student. Accepting the common traditionary view, he thinks of successful teaching only as securing the learning of certain subjects by his pupils, and of the maintenance of good order and industry as means to that end.

Before entering upon his work, and before he has become set in his way, and confirmed by narrowing experience in low aims, is the time when the best influence should be brought to bear upon him. Formation is much easier than reformation, and no teacher is so little capable of improvement as one whom experience has confirmed in bad habits. And this furnishes the strongest argument for an extension of the training course, that the students may begin to teach with a broad conception of the work which they have to do and may be thoroughly grounded in the best methods of doing it. In this, as in everything else involving thought and skill, time is an essential element

The briefest consideration of the purpose of education and of the relation of the teacher thereto will emphasize the importance of this training by reason of what is necessarily involved.

Education is the institution which man, through the ages, has worked out for the advancement and protection of his culture, and each generation becomes the trustee and guardian of its civilization. The character of the next generation will depend mainly upon the work of the present. If we would provide for the future, we must lay the foundation now. It is wiser to trust to present effort than to future chance.

To subdue the all dominating self, to lift man out of his original nature into his ideal nature, to fit him for making the most and the best of himself and to prepare him for intelligent citizenship, this is to educate and to civilize. In this does the purpose of education rest, and by this alone may its progress be measured. Its gains will be realized in the best works of men's hands, of men's heads, and of men's hearts; in literature, in art, in industry, in the home, in society, in the state, in the church. In what is best in these, the education of the day expresses itself best; and where education best expresses itself the man of that day comes nearest to realizing his ideal nature. This is the vantage-ground from which man may survey the progress made and the progress to be made.

Progress toward the ideal nature depends upon man's knowing early and doing early. Here lies the raison d'être and the province of formal education. The child learns early to interpret the home-life, but he has only dim conceptions of the great world of man. The school receives him and forms the connecting link between the home and that world. It connects what he has been with what he must be. It represents to him in miniature the world to which he travels, and seeks through the school-life to so interpret it for him that when he drops into his little niche in the great world he may properly perform "without jar or friction" the duties of the man and the citizen.

But the school is the teacher and the teacher must do this work; and as water will not rise above the fountain whence it issues, so will the school not rise above the teacher. How then shall he be equipped for his duties?

Art demands knowledge. This knowledge must reveal clearly the end we have in view, and must guide in the selection and use of such agencies as are known to be the proper means to the end proposed. Lack of knowledge as to the end, or the agencies must result in either partial or total failure. The amount and the need of scientific knowledge depend upon the complexity of the art proposed. The work of education is more complex than that of any other art, and hence the means to the end are difficult to discern. We have to deal with a conscious mind in a living organism, with mental processes and mental growth, and are required to discern and to apply such stimuli to this complex entity as will cause reaction resulting in the acquistion of knowledge and the harmonious developement of the human powers.

While the professional course should include special reviews of the subjects taught in public schools in order that the imperfect knowledge of the student may be broadened into the more logical knowledge of the teacher, yet the main purpose of the training is to lead the student into what is to him a new field of labor. He must be led, as I have said, to understand the nature and purpose of education. He should also be made familiar with the growth and advancement of both ancient and modern educational systems through the study of the lives, the theories and methods of great educators both of the past and of the present. These will broaden his conception, and inspire him with

higher aims, will guard him against errors, and will lead to the discernment of those fixed principles which are involved in all true education.

He must especially know the being to be educated in his physical, his intellectual and his moral nature. He should be thoroughly familiar with the laws of sanitation in relation to heating, lighting, seating, ventilation and proper keeping of the school. He should understand the relation between physical conditions and mental activity, and should know the mind in its three-fold function, as intellect, emotion and will, with the interdependence of these. He should understand how knowledge is acquired, assimilated and developed by the mind, in order that his practice may be in harmony with the principles of education. Psychology sets forth these priniciples. It enables the teacher to see his way instead of feeling it, and unless teaching rests upon a basis of science it will ever remain empirical and be but a succession of experiments, too often involving painful waste. "Science gives an authority representing not merely individual experience however good, but rather the collective experience of the ages" properly classified and formulated. The science of education forms a rational basis for correct methods of teaching.

The value of method depends mainly upon the relation in which it puts the child towards the acquisition of knowledge, and towards the development of his own powers. Correct methods of teaching rest upon fundamental principles and lead to correct thinking, and when these principles are apprehended by the teacher he grasps the relation between the science and the art of teaching, and thereby obtains a broader conception of the educational problem.

But the teacher must do more than store or develop the minds of his pupils, or guard their physical well-being. He has to deal with their moral nature and fashion character. This will invoke his highest efforts, for it is much easier to cultivate intelligence than to develop character.

The relation of man to his fellow-being gives rise to morals. Outside of this relation morality cannot exist—cannot be conceived of. And, as all primary knowledge is acquired through consciousness of reality—of the concrete, so moral notions must be acquired through actions which involve morality. The child's first ideas of right and of wrong are never acquired from precepts, however excellent these may be, but from acts, from his own acts in relation to those in authority over him. What the parent permits him to do gives him his first idea of right, and what is prohibited gives him his first idea of wrong. He can have no other standard at first. By this standard he measures the example of others, and by this means alone can precept be interpreted through his own experience.

The teacher, therefore, will not restrict his moral or religious teaching to any set formal exercises, nor will he rely mainly upon the mere reading of the Scriptures. The latter will serve a useful purpose, and should form a part of the daily exercises of the school-room, but the ethical value of the school lies in its atmosphere of conscientious service, inspired by a Christian teacher, in the inspiration which comes from its moral tone, in the faithful performance of duty, and in the practice of social virtues. In short pupils must be led to do the right, for it is upon habits of right practice, rather than upon the memory of right precepts, that we must rely for the formation of character.

The Model School Master is to his students a model school-master. Their ideas of teaching and of school management are acquired mainly through the examples furnished by him, and every Principal of a Model School knows how attentively his students observe models, and how closely they try to reproduce them. But above the purposed imitation of methods is the unconscious assimilation of the Principal's spirit and ideals. This is the most important and the most lasting of all the impressions received in the Model School. It remains to inspire and bless the students, and through them, their pupils, long after the formal instruction has been forgotten. In this, as in other things, "it is the spirit that giveth life."

The teacher, then, must ever be the great moral force of the school-room, and as the prophet breathed his spirit into his hearers, so must he breathe the spirit of life into his pupils. He will then be a living power for good, and will be ever directing and lifting the minds and aspirations of his pupils upwards.

He must, through proper methods, seek not only to approach the intellect, but he must also find that method of approach which touches the heart, arouses ambition and awakens a new life. He will not be satisfied with passing children from one class to

another, but will see his highest success in the lives of those who go forth from his school to act well their part as men and women. He will aim not only to increase the nation's knowledge, but to influence for good the nation's life.

If, then, we wish to send out a body of teachers properly equipped, we must see to it that this training is broad enough and deep enough to afford them the best possible preparation for their work through the science and technique of their profession, and also to develop within them a proper conception of the responsibilities and of the grand possibilities of education, and to inspire them to be ever looking onward and upward towards a higher ideal. To this ideal they may never attain. To overtake it would be to destroy it. But through their efforts they will be constantly advancing, and as the volume of our national life flows onward in its course it will ever be broadened and enriched by streams of ennobling influence which have their origin in the labors of our faithful and efficient teachers.

STATISTICS OF COUNTY

Name of Model School.	Name of Principal.	Certificate of Principal.	Salary of Principal.	Year of appointment.	Time Principal devotes to Model School work daily during the term.	No. of assistants with 1st class certificates.	No. with 2nd class	No. with 3rd class.	No. with other class.
			$						
1 Athens	C. Ross McIntosh	I	500	1901	all day	....	3	....	.. ....
2 Barrie	W. J. Hallett	I	900	1893	"	....	8	....	.....
3 Beamsville	H. J. Talbot	I	600	1898	"	1	3	....	... .
4 Berlin	J. Suddaby	I	1,100	1877	all except 2 hrs. a week	....	7	3	.....
5 Bracebridge	W. C. Shier, B.A.	I	650	1900	all day	2	3	3	.....
6 Bradford	A. Orton	I	800	1888	"	....	4	....	.....
7 Brampton	Wm. F. Sparks	I	725	1901	"	1	8	....	.....
8 Caledonia	Robt. G. Elliott	I	600	1901	"	1	3	....	.....
9 Chatham	J. W. Plewes	I	900	1900	"	....	14	1	....
10 Clinton	W. R. Lough	I	850	1884	"	1	5	...	.....
11 Cornwall	Jos. W. Crewson, B.A.	I	750	1901	"	...	10	1	.....
12 Durham	Thos. Allan	I	700	1888	"	1	3	1	2 B.A's.
13 Elora	Jas. A. Underhill	I	600	1901	5 hours	....	4	....	1 B.A.
14 Forest	Jas. Campbell	I	750	1894	all day	...	5	....	.....
15 Galt	R. Alexander	I	1,000	1875	"	2	6	...	... ..
16 Gananoque	J. C. Linklater	I	1,000	1888	"	1	6	4	.....
17 Goderich	Robt. Stewart	I	800	1900	"	2	10	....	.....
18 Hamilton	W. W. Charters, B.A., B. Paed.	I	875	1900	5 hours	1	6	....	1
19 Ingersoll	H. F. McDiarmid	I	900	1885	all day	2	7	3	.... ..
20 Kincardine	Samuel T. Crane	I	700	1901	"	1	3	3	.....
21 Kingston	L. E. Staples, M.A.	I	700	1899	"	....	9	....	1
22 Lindsay	G. E. Broderick	I	1,000	1888	"	2	18	....	.....
23 London	Geo. B. Kirk	I	1,200	1900	5 hours	1	9	..	.....
24 Madoc	T. C. Tice	I	750	1897	all day	....	5	1	.....
25 Meaford	M. N. Clark, B.A.	Interim	700	1899	"	1	3	4	.. . ...
26 Milton	Wm. F. Inman	I	780	1893	"	....	4	1	.....
27 Minden	Wm. J. Stevenson	I	450	1901	5½ hours	....	1	1	.....
28 Mitchell	J. H. W. McRoberts	I	650	1899	all day	2	4	....	.....
29 Mt. Forest	G. R. Theobald	I	700	1900	"	....	8	....	.....
30 Morrisburg	A. E. Meldrum	I	800	1895	"	....	5	2	.....
31 Napanee	C. H. Edwards, B.A.	I	900	1899	"	2	5	1	2
32 Newmarket	J. W. Forhan	I	675	1899	"	1	4	....	.....
33 Norwood	Jos. Frappy	I	600	1900	"	....	5	....	.....
34 Orangeville	M. N. Armstrong	I	800	1885	"	....	10	....	.....
35 Owen Sound	T. A. Reid	I	1,100	1894	"	....	25	....	.....
36 Parry Sound	A. M. Currie	I	750	1896	"	2	6	1	2
37 Perth	M. M. Jaques	I	1,000	1884	"	....	8	....	1
38 Picton	S. C. Woodworth	I	700	1901	"	2	6	....	.....
39 Port Hope	F. Wood	I	1,000	1885	"	....	12	3	.....
40 Port Perry	Alex. M. Rae	I	800	1877	"	2	3	2	.....
41 Prescott	A. A. Jordon	I	1,000	1899	"	1	6	....	.....
42 Renfrew	W. A. Stickle	I	675	1900	"	....	7	....	.....
43 Richmond	J. L. Bryant	I	575	1899	"	1	2	....	.....
44 St. Thomas	*S. Silcox, B.A., B. Paed	I	1,200	1899	"	2	7	2	.....
45 Sarnia	A. Wark	I	950	1877	"	1	8	....	..... .
46 Simcoe	Isaac S. Rowat	I	800	1889	"	...	7	1	.....
47 Stratford	*J. Russell Stuart	I	1,100	1887	" except when insp'ng	2	21	1	.....
48 Strathroy	Thos. Dunsmore	I	850	1882	all day	....	8	....	.....
49 Toronto	W. E. Groves	I	1,350	1895	"	1	10	....	3
50 Toronto Junction	Wm. Wilson	I	1,000	1899	"	1	11	....	.....
51 Vankleek Hill	S. J. Keys	I	770	1898	"	....	4	....	.. ....
52 Walkerton	W. I. Chisholm, M.A.	I	800	1900	"	2	7	....	.....
53 Whitby	J. A. Brown	I	950	1877	"	1	2	1	3
54 Windsor	David M. Eagle	I	900	1901	"	....	7	....	1 B.A.
55 Woodstock	S. Nethercott	I	950	1893	"	....	29	....	.....
Totals	8 University Graduates	54 I 1 Interim.				43	404	40	17

* Inspector of Public Schools.

MODEL SCHOOLS, 1901.

	Time assistant relieved Principal from Public School work daily.	Is separate room provided?	Is there a professional library? No. of volumes.	Government grant.	Municipal grant.	Fees.	No. of divisions in school.	No. of divisions used for Model School purposes.	No. of students sent at one time to observe.	No. of students sent at one time to teach.	Length of time students are trained before being sent to the divisions to observe.	Length of time students are trained before being sent to the divisions to teach.
				$	$	$						
1	all day	Yes	95	150	150	110	4	4	5 or 6	5 or 6	6 weeks	6 weeks
2	.. ..	"	75	150	150	110	8	8	3	3	6 "	6 "
3	all day	"	113	150	150	140	4	4	7	7	5 "	6 "
4	all except 2 hrs. a week	"	97	150	150	30	10	9	2	2	6 "	6 "
5	all day	"	100	300	.....	70	8	7	4 or 5	4 or 5	5 "	7 "
6	"	"	85	150	150	130	4	4	6 or 8	3 or 4	6 "	7 "
7	"	"	80	150	250	102	9	9	4	4	6 "	7 "
8	"	"	120	150	150	50	4	4	3	2	6 "	6 "
9	"	"	350	150	150	185	15	15	4 or 5	4 or 5	4 "	7 "
10	"	"	100	150	150	150	7	7	3 or 4	3 or 4	6 "	6 "
11	"	"	175	150	150	105	10	10	3	3	... .	6 "
12	"	"	80	150	150	70	7	5	3	3	6 weeks	8 "
13	"	"	91	150	150	80	5	5	4	4	6 "	7 "
14	"	"	80	150	150	65	6	5	3	3	6 "	6 "
15	"	"	109	150	150	55	9	8	11	4	6 "	8 "
16	"	"	90	150	150	35	12	5	2	2	6 "	7 "
17	"	"	80	150	150	145	12	12	4	4	6 "	6 "
18	5 hours	"	250	150	150	165	8	66	3	3	6 "	6 "
19	....	"	90	150	150	35	14	11	3	3	6 "	8 "
20	all day	"	87	150	150	70	8	6	14	.....	4 "	6 "
21	"	"	202	150	150	110	9	9	4	4	6 "	6 "
22	"	"	60	150	150	110	20	11	2	2	5 "	7 "
23	5 hours	"	70	150	58	245	10	10	5	5	1 day	4 "
24	all day	"	150	150	250	135	6	6	4 or 5	4 or 5	6 weeks	6 "
25	"	"	64	150	150	75	8	8	4	4	6 "	8 "
26	....	"	82	150	200	75	7	5	3	3	6 "	6 "
27	5½ hours	"	128	150	150	15	3	3	3	3	6 "	6 "
28	all day	"	80	150	150	75	7	7	3	3	6 "	6 "
29	"	"	93	150	150	115	8	8	2 or 3	2 or 3	6 "	6 "
30	"	"	93	150	150	90	7	7	4	4	5 "	6 "
31	"	"	200	150	25	145	10	8	3 or 4	3 or 4	5 "	.....
32	"	"	105	150	175	65	6	6	2 or 3	2 or 3	6 "	6 weeks
33	"	"	74	150	150	150	5	5	15	6	4 "	6 "
34	"	"	96	150	150	164	10	10	3 or 4	3 or 4	7 "	7 "
35	....	"	180	150	150	150	26	18	3	3	5 "	8 "
36	all day	"	80	300	.....	100	11	6	4	4	6 "	6 "
37	"	"	68	150	150	150	10	10	4 or 5	4 or 5	6 "	7 "
38	"	"	100	150	150	110	8	8	3	2	6½ "	7 "
39	"	"	83	150	250	195	15	13	3	3	6 "	6 "
40	"	"	120	150	150	145	6	6	6	6	6 "	6 "
41	"	"	92	150	150	75	7	7	2 or 3	2 or 3	6 "	6 "
42	"	"	85	150	150	150	8	8	4	4	6 "	6 "
43	"	"	81	150	500	5	3	3	3	2	8 "	8 "
44	....	"	85	150	150	180	11	11	6	6	5 "	5 "
45	.....	"	86	150	150	100	9	9	3	3	6 "	6 "
46	all day	"	140	150	150	85	8	8	2	2	7 "	8 "
47	....	"	275	150	150	120	24	21	.....	.....	6 "	6 "
48	all day	"	96	150	150	95	9	9	2 or 3	2 or 3	6 "	6 "
49	"	"	225	150	150	150	12	12	30	2	3 "	6 "
50	"	"	60	150	.....	150	16	16	3	3	6 "	6 "
51	"	"	60	150	200	105	4	4	5	5	6 "	7 "
52	"	"	100	150	150	110	9	9	2 or 3	2 or 3	6 "	6 "
53	"	"	118	150	150	73	7	7	4	4	6 "	7 "
54	"	"	77	150	150	105	8	8	3	3	6 "	6 "
55	"	"	145	150	150	90	30	20	2	2	6 "	8 "
			6,200	$8,550	$8,348	$5,914						

STATISTICS OF COUNTY

Name of Model School.	Number of weeks students teach in the divisions.	Number of hours per day.	Number of classes in the division used for Model School purposes.	Average number of lessons taught by each student during the term.	Average number of lessons each class will be taught by all the students during the term.	Average length of each lesson.	Time students remain in a division before passing to another.
1 Athens	7	1¼	10	18	40	20 min.	1 week
2 Barrie	7	1	16	21	29	18 "	1 "
3 Beamsville	8	1½	9	16	50	20 "	1 "
4 Berlin	6	1	15	26	10	25 "	5 days
5 Bracebridge	7	1¼ to 1½	16	20	18	20 "	1 day
6 Bradford	6	2	10	16	41	20 "	1 week
7 Brampton	5	1¼	20	22	22	15 "	1 day
8 Caledonia	7	.....	10	20	20	25 "	1 week
9 Chatham	5	1⅓	23	23	37	20 "	3 days
10 Clinton	4	⅔	15	23	37	20 "	3 "
11 Cornwall	5	1½	24	18	16	20 "	3 "
12 Durham	4	1½	11	20	25	20 "	3 "
13 Elora	7	1⅓ to 2	14	20	23	20 "	4 "
14 Forest	6	1	14	18	17	20 "	1 week
15 Galt	4 or 5	1⅔	12	19	17	20 "	1 day
16 Gananoque	5	⅔	11	20	13	20 "	1 week
17 Goderich	4	1¾	34	18	16	20 "	4 days
18 Hamilton	7	1	66	25	2	20 "	1 week
19 Ingersoll	5	1	14	15	8	25 "	3 days
20 Kincardine	5	1¼	12	21	24	25 "	2 "
21 Kingston	6	1⅔	29	21	13	20 "	4 "
22 Lindsay	5	1	30	16	12	25 "	2 "
23 London	8	1⅓	10	25	122	15 "	1 day
24 Madoc	6	1¾	14	18	34	15 "	3 days
25 Meaford	4	2	12	18	23	20 "	1 day
26 Milton	6	1	16	20	19	20 "	1 week
27 Minden	6	1	12	18	4	20 "	1 "
28 Mitchell	7	1½	9	23	38	20 "	4 days
29 Mt. Forest	6	1¼	16	16	23	22 "	2 "
30 Morrisburg	5	1½	15	16	26	18 "	1 week
31 Napanee	5	1½ to 1¾	14	20	41	25 "	1 "
32 Newmarket	6	1	12	24	26	20 "	1 "
33 Norwood	6	1¼	10	14	42	20 "	2 days
34 Orangeville	6	1¼	22	24	35	20 "	1 week
35 Owen Sound	4	1⅓	24	18	22	20 "	2 days
36 Parry Sound	6	1⅓	13	20	30	20 "	1 week
37 Perth	6	1⅓	10	19	55	20 "	1 "
38 Picton	5½	1	13	20	34	20 "	4 days
39 Port Hope	6	⅔	20	16	31	20 "	1 week
40 Port Perry	6	1	12	8	20	20 "	1 "
41 Prescott	6	1¼	15	22	22	25 "	1 "
42 Renfrew	6	1½	20	20	30	20 "	1 "
43 Richmond	6	1¼	8	30	19	25 "	1 "
44 St. Thomas	8	1¼ to 1½	11	21	70	25 "	1 "
45 Sarnia	7	⅔	26	23	18	20 "	4 days
46 Simcoe	4	1¼	12	20	28	20 "	2 "
47 Stratford	6	1¼	54	22	11	20 "	1 week
48 Strathroy	6	⅔ to 1	27	27	19	20 "	4 days
49 Toronto	6	1	14	19	*20	25 "	1 day
50 Toronto Junction	6	1	16	18	33	20 "	3 days
51 Vankleek Hill	4	3	13	18	28	20 "	4 "
52 Walkerton	6	2¼	17	20	26	20 "	4 "
53 Whitby	7	1⅓	18	26	21	20 "	1 week
54 Windsor	8	1¼	11	25	46	20 "	1 "
55 Woodstock	6	to 1	20	24	21	30 "	4 days
Totals	.....	.....	.....	.....	....	.....	.....

*Students do half of teaching in other schools.

MODEL SCHOOLS.—*Concluded.*

	Number of students on roll.	Male.	Female.	Number who passed final examination.			Number with Senior Leaving standing.	Number with Junior Leaving standing.	Number with Primary standing.	Number with P. S. L. standing (District).	Allowance made by trustees to principal's assistant.	Number of renewals granted by the Board.	Average age of students.
				Male.	Female.	Total.							
											$		
1	22	9	13	9	13	22	3	14	5	.....	120	6	19.67
2	22	11	11	11	11	22	.....	22	.....	.....	.....	9	19.83
3	28	5	23	5	23	28	.. ..	28	.....	.....	125	6	20.
4	6	2	4	2	4	6	.....	6	.....	.....	165	4	19.
5	14	2	12	2	11	13	.....	2	....	12	140	20	18.35
6	26	11	15	11	15	26	2	23	.....	1	125	.....	19.
7	20	4	16	3	14	17	1	19	1	....	100	.....	18.33
8	10	5	5	5	5	10	.....	10	.....	.....	....	2	19.
9	37	8	29	8	29	37	2	35	.....	.....	160	42	18.75
10	24	11	13	11	13	24	2	21	1	.....	115	3	19.5
11	21	5	16	5	16	21	1	20	.....	.....	150	20	18.71
12	14	5	9	4	9	13	.....	12	1	1	130	7	19.
13	16	8	8	8	8	16	1	14	1	.....	128	4	19
14	13	6	7	6	7	13	.....	13	.....	.....	130	... .	18.5
15	11	1	10	1	10	11	.....	11	.....	.....	.. .	....	19.27
16	7	1	6	.....	5	5	.....	6	1	.....	50	.....	19.
17	30	14	16	14	15	29	2	27	1	.....	150	8	19.5
18	33	6	27	4	23	27	2	31	.....	.....	120	8	19.
19	7	4	3	4	3	7	.....	7	.....	.....	150	.....	19.
20	14	9	5	9	5	14	....	14	.....	.....	135	2	18.5
21	22	6	16	6	15	21	3	18	.....	1	.....	16	19.86
22	22	9	13	7	13	20	1	21	...	.....	.....	6	19.4
23	49	8	41	6	39	45	6	40	3	.....	+250	... .	19.5
24	27	9	18	9	16	25	.....	18	.....	9	140	21	19.07
25	15	7	8	7	8	15	1	12	.....	2	140	4	19.
26	15	3	12	2	11	13	.. ...	14	1	.....	.....	7	19.
27	3	.....	3	.....	2	2	...	.....	...	3	...	8	19
28	15	7	8	5	8	13	1	14	.....	.....	175	.....	19.
29	23	7	16	7	16	23	.....	23	.....	.....	100	2	18.75
30	24	12	12	12	11	23	1	23	.....	.....	150	13	19.
31	29	9	20	9	20	29	3	23	.....	3	.... ..	10	19.
32	13	8	5	8	5	13	3	10	.....	.....	125	....	19 5
33	30	12	18	12	18	30	....	28	1	1	130	.....	18.7
34	32	14	18	13	18	31	1	31	.....	.....	130	8	20.
35	30	8	22	8	22	30	7	23	.....	....	.....	9	19 33
36	20	2	18	2	18	20	.....	5	.. ..	15	200	29	19.
37	29	2	27	2	27	29	1	25	3	.....	135	12	19.
38	22	11	11	11	11	22	.....	21	.. ..	1	135	13	19.41
39	39	10	29	9	28	37	6	32	1	.....	.....	10	19.03
40	29	10	19	8	17	25	4	23	2	.....	150	8	20.
41	15	2	13	1	13	14	.....	13	2	.....	150	2	19.
42	30	5	25	5	25	30	.....	30	.....	.....	125	16	19.
43	5	2	3	2	3	5	....	5	.....	....	150	8	20.
44	37	14	23	14	23	37	3	34	....	.....	.....	9	19.
45	20	8	12	8	12	20	3	17	.....	.....	.....	.....	19.3
46	17	8	9	7	9	16	.....	17	.....	.....	160	15	19 35
47	27	9	18	9	18	27	4	23	.....	.....	.....	2	19.5
48	19	7	12	7	12	19	1	18	.....	.....	175	.....	19.33
49	30	3	27	3	27	30	2	28	.....	.....	.....	10	18.83
50	30	10	20	10	18	28	2	27	1	.....	150	.....	19.
51	21	4	17	4	15	19	1	20	.....	....	130	7	19.
52	22	15	7	15	7	22	1	21	.....	.....	130	10	19.
53	15	3	12	3	11	14	7	8	.....	.....	135	6	19.
54	20	7	13	7	12	19	3	15	1	.....	180	7	19.
55	18	7	11	7	11	18	1	17	.. ..	.....	.....	9	19.
	1,189	385	804	367	778	1,145	82	1,032	26	49	.....	. ...	19.14

† In addition, $30 each to 9 assistants.

APPENDIX J.—*PROVINCIAL NORMAL AND MODEL SCHOOLS*

I. PROVINCIAL NORMAL AND MODEL SCHOOLS, TORONTO.

1. Staff of Toronto Normal School. 1901.

Wm. Scott, B. A.	Principal.
W. H. Elliott, B A.	Vice Principal.
A. C. Casselman	Drawing Master and in Model School.
A. T. Cringan	Music. " "

Students Admitted, 1901.

	Male.	Female.
First Session	24	108
Second Session	19	105
Total	43	213

2. Staff of Provincial Model School, Toronto, 1901.

Angus McIntosh	Head Master.
Miss M. Meehan	First Female Assistant.
R. W. Murray	First Male "
Miss May K. Caulfeild	"
Thomas M. Porter	"
Miss E. M. Hill	"
" Jeannie Wood	"
" Alice Stuart	"
" A. F. Laven	"
" Sarah M. Ross	"
" Mary E. Macintyre	Kindergarten Directress.
" Ellen Cody	" Assistant.
Mrs Jean Somers	Instructor in Calisthenics.
" Emma Macbeth	" Domestic Science.
Sergeant-Major D. Borland	Drill Master.
Eugene Masson	French Teacher.

Number of Pupils in 1901.

Boys, 265	Girls, 254	Total, 519
Kindergarten		Total, 71

3. Report of Principal Scott.

To the Honorable Richard Harcourt, M. A., K. C., Minister of Education for Ontario.

Sir,—In response to your request for "a report from the Principal of each of the Normal Schools, dealing with the requirements for admission, the character of the training given, the length of the session, the examinations for certificates, and any other matters that may properly be brought before the public," I have the honor to submit the following regarding the Toronto Normal School:—

The work of a Normal School may be said to embrace the following.—

(*a*) The subjecting of the knowledge of the students to such analysis as will develop power.

(*b*) The organizing of knowledge so that the student may not only see the relation of each part of a subject to the whole, but also understand the relation of one subject to another, and of the various subjects to the mind of the child.

(*c*) The understanding of the ends of school education as comprehending the acquisition of knowledge, the development of power, the formation of right habits, and the building up of pure tastes and reverence for whatsoever things are just and pure and lovely and of good report.

(*d*) The setting forth of those qualities of mind and heart which every teacher of children should have, such as reverence, sympathy, culture, and conscientiousness in the discharge of duty.

(*e*) The imparting of clear and correct ideals in teaching and the illustrating of these by a Model School as nearly perfect as possible.

(*f*) The making clear that the personal qualification of the teacher is of far more importance than knowledge, whether it is of men and things or of the subjects and principles of teaching; that the teacher is always educating, whether in the school-room or on the street; that school is a mirror of what the teacher is; and that this teaching by example is the most potent of all kinds of school work.

Practice teaching, to be of value, must be conducted under proper conditions, otherwise the experience may do harm instead of good to the students in training It is therefore essential that the Model School should be maintained in as high a state of efficiency as is possible. Only teachers of high scholarship, approved teaching power and varied experience, should be employed.

The Provincial Model Schools are primarily for illustrative teaching by experienced instructors. They are in no sense mere prac ice schools, nor are they intended for purely experimental work to determine the value of new methods. Students visit them first for purposes of observation and critical study of methods and management. In the early part of the course this work is one of the most important duties of the students. It adds greatly to the value of the theory discussed when they observe how it can be applied in actual practice. Besides, much of the theory of teaching can be more readily imparted by an analytical study of concrete examples than by dogmatic teaching followed by examples.

After a series of observation lessons has been discussed the students are required to teach regular lessons assigned by members of the staff. These lessons are always integral parts of the regular work of the class. This arrangement gives a definiteness and naturalness to the practice-teaching which cannot be reached if the work assigned to students is not directly along the regular line of class study. After a lesson has been taught by a student it is followed by criticism conducted by the regular teacher of the class, assisted by other students who have observed the whole lesson.

Criticism, to be of value, must involve encouragement, assistance and counsel. Carping criticism, fault-finding and scolding on the part of the critic teacher, must be entirely avoided. The main object of the criticism should be to direct the efforts of the students and not to repress them. It is therefore most important that those who are entrusted with the duty of criticism should be men and women of culture and discretion.

Each succeeding session serves more and more to confirm me in the belief that a large percentage of the students receive a very inadequate training in those things which, it seems to me, it is the express purpose of a Normal School to give. This is mainly due to two causes: (1) insufficient academic knowledge on entering the School; and (2) lack of time to assimilate the matters presented. For reviewing the subjects of the Public School course, the time is altogether too short. Such review would be helpful in all cases and is absolutely necessary in those lacking in academic preparation, for that there are some who are insufficiently prepared is shown by faulty English, failure to grasp the underlying principles of Arithmetic and Grammar, and inability to think consecutively. Such do not receive all the benefit they should from a course here.

That the fault of having too much to do in the time does not rest with a too extensive curriculum is evident from a comparison of that in use in the Normal Schools of Ontario with those of similar institutions elsewhere. No subject now receiving attention can be dropped, for nothing is discussed which is not actually a part of the programme of the Public Schools of Ontario. There should, however, be additions to the calendar if the work of these schools is to be kept abreast of the times. Educationally the world is moving at a rapid rate and, if this institution is to continue to be worthy of its traditions and to give that training which the present demands of the teacher require, increased

accommodation must be provided. At present this school is so crowded that there is not even sufficient cloak-room accommodation. Rooms are required for Manual Training and Domestic Science. No attempt is now made to make the students acquainted with the rudiments of Manual Training. The ladies receive training in Domestic Science; but the room they use, which is at a distance from the school, is quite inadequate to accommodate so large a number with comfort. With proper facilities these subjects could be introduced to the girls and boys of the Model School, thereby adding much to the efficient training already given to them.

At present one lesson a week is devoted to religious instruction. I have long felt that it would be a forward movement to have a suitable, definite course of instruction laid down, as in the other subjects, to be followed by each denomination, and that this subject should be placed on the same basis as the others. The result would be that in time our teachers would have such a knowledge of the Bible as would greatly enhance their usefulness not only in school but also out of it.

The entrance examination to the Normal School is now upon the teachers' "reading course" for the current year. While this is sound in theory, in practice it is found that few, very few teachers entering the Normal School have made a real study and a careful analysis of the prescribed works. The majority have given a hasty reading of these works to qualify themselves for entrance here. Then those who receive cards of admission only a few days before the session begins have no opportunity of reading them at all. I would suggest that the entrance examination consist of three papers, one on Public School Arithmetic, one on Public School Grammar and one on a volume of Parkman, it being understood that the same volume be examined upon year after year. A student who failed under these circumstances to pass a satisfactory examination could be rejected without doing him any injustice.

As now conducted, the final examination seems to me as satisfactory a mode of fixing the standing of each student as can be devised. The final result is determined by combining the result of tests applied by examiners appointed by the Educational Council and of those applied by the staffs of the Normal and Model Schools It has the great merit of keeping the Normal Schools and the Public Schools in touch with one another. Then again the finding reached does not depend upon one final test alone; but the entire work and general bearing of each student from the day he enters the institution form an important factor in fixing his standing.

The number of students atttending a Normal School is limited by the capacity of the Model School. For sessions past, the Model School here has been taxed to the utmost. One and a half hours per day is all the time which can, without serious injury to the pupils of the Model School, be devoted to practical teaching. If the term is lengthened to embrace an academic year, only half the number of teachers with second class certificates would be qualified. I believe that the loss of such teachers to the country would not at all reach this proportion; for with the greater length of time and the increased cost of obtaining a certificate, only those who intend to teach for a considerable time would attend. Teaching would be less used than at present as a stepping-stone to something else and thus there would be a considerable increase of permanency.

I cannot allow this opportunity to pass without bearing testimony to the zeal, energy, and painstaking work of my colleagues in the Normal School and to the Head Master and teachers in the Model School and Kindergarten. These are all intent upon doing what they can to make the work of training the Normal School Students as efficient as possible.

TORONTO, Dec. 21st, 1901, WM. SCOTT.
Principal.

II.—PROVINCIAL NORMAL AND MODEL SCHOOLS, OTTAWA.

1.—STAFF OF OTTAWA NORMAL SCHOOL, 1901.

John A. MacCabe, M.A., LL.D ..... Principal.
S. B. Sinclair, B.A., Ph.D ..... Vice-Principal.
J. A. Dobbie ..... Drawing Master, and in Model School.
T. A. Brown ..... Music " "

Students admitted, 1901.

	Male.	Female.
First Session	25	78
Second Session	18	60
Total	43	138

2. Staff of Provincial Model School, Ottawa, 1901.

Edwin D. Parlow	Head Master, Boys' Model School.
J. H. Putnam	Assistant "
J. F. Sullivan	" "
Miss H. S. Williams, B.A	" "
" Adeline Shenick, B.A., B, Sc	Head Mistress, Girls' Model School.
" A. E. G. Wilson	Assistant "
" M. E. Butterworth	" "
" Florence Hanington	" "
" Eliza Bolton	Kindergarten Teacher.
" J. S ocks	" Assistant.
" Elizabeth H Keyes	Teacher of Physical Culture.
J. Fleury	French Teacher.

Number of Pupils, 1901.

Boys, 142 ..... Girls, 138 ..... Total, 280
Kindergarten ..... Total, 51

3. Report Dr. John A. MacCabe, Principal.

To the Hon. Richard Harcourt, M.A., K.C., Minister of Education:

Sir,—I desire to present for your consideration the following report on the present condition of this Institution, and some suggestions as to changes which I think highly desirable for the better accomplishment of the work the school is intended to do.

On the 14th September, 1900, the school having completed the twenty-fifth year of its existence, appropriate ceremonies marked the event. About seven hundred of the old students were present, and the enthusiasm of the re-union, and of the feeling towards the school, was most gratifying

The attendance has kept up to, and in many cases has gone beyond the limit of our accommodation. The attendance for 1900 was: January-June, 25 males and 74 females; August-December, 17 males, 72 females; for 1901: January-June, 25 males, 78 females; for the present session: 18 males and 59 females.

It is stated that the small attendance for the present session is due to the fact that an increase in salaries—attendant on a scarcity of teachers—has induced many who, under other circumstances, would come to the Normal School immediately after one year's teaching, to take up a second year's teaching; and may induce them to proceed to the limit—three years. In the class at present in attendance, only five students have entered after one year's experience. If the statement about the increase of salary be true "it is a consummation devoutly to be wished."

The work assigned by Departmental Regulations has, with some additions, been faithfully carried out.

The Normal School students are honorary members of the Ottawa "Field Naturalists' Club" This club makes regular excursions through the surrounding districts to study the botany, geology, entomology, etc., of the country. The students go on these excursions, and the practical nature of the work done is very helpful in "Nature Study." Many of the officers of the club give lectures to the students in the Normal School

An effort has been made to work out and apply as far as is practicable, in the Model School, a related and sequential course in this study, adapted to the surroundings and stage of development of the pupils. In the spring of the present year, for each of the

eight Model School divisions, and for the Kindergarten, a portion of the grounds was set apart as a "garden." The pupils of the divisions sowed seeds, and observed the growth from the first appearance of the plant, to maturity. The care and attention paid by the pupils to this, showed the interest taken in it; and how profitable it was to them. Besides this, the pupils took up the study of birds and physical phenomena. The subject of Ecology or life relations of plants (as indicated in Coulter's Botany and Chicago University Elementary Record) is now receiving considerable attention

During the present session the students of the Normal School and Model School pupils, being furnished with flower pots, attend to the planting and watering of specimens; make observations and drawings of the changes which occur at successive stages of growth; and study the relations of these to light, heat, moisture and atmospheric conditions

To this department there have been added during recent years, a collection including all the principal Canadian birds, a Colt's lantern and a number of lantern and microscopic slides. In addition to the plant study previously referred to, the Normal School students are required to hand in a number of herbarium specimens collected and mounted during the session. Lessons on these topics form a due proportion of the lessons assigned for "Model School Practice."

The work in Agriculture is rendered more practical by visits of the students to the Experimental Farm, where the Director and members of the staff explain the modus operandi of the various lines of investigation pursued there.

In Science of Education, definite work in Child Study and Experimental Psychology is made an important part of the Course.

Last session the male students gave up some of their recreation hours—between 4 and 6 p. m.—to manual training—apparatus for which is installed in the School for the use of the senior boys of the Model School. Of the twenty-five male students in attendance, twenty four entered on the work; and a number of them continued the Course through the summer holidays. Four of them have obtained positions as instructors in new Manual Training Schools, under Sir William MacDonald's endowment, and begin at a salary of $700 per annum.

For an hour and a half each week, the female students of the Normal School take practical instruction in Domestic Science at the Y. W. C. A.

During the present session Domestic Science has been added in the Senior Classes in the Girls' Model School; Sewing in the Junior Classes of the same School; and Card Modelling in the Junior Classes of the Boys' Model School. This has added much to the popularity of the Model School, which has now reached the limit of its capacity in attendance

And now to offer a few suggestions for what appear to me as most desirable changes

1. The first is an extension of the term of training. I may repeat what I have said on another occasion.

The Normal School sessions are, nominally, five months long. The fall session of 1898 was exactly three months of "class" work. That anything approaching perfect training in all the subjects set down in the Normal School programme can be accomplished in so short a time no one will seriously maintain. The imperative necessity for at least a ten months' session in the Normal Schools is realized every session more and more by masters and students. Even you, Sir, in your last report, give the weight of your opinion to this contention. The Boston Normal School, which some years ago was organized on a plan similar to that of the Ontario Normal Schools, began with a five months session as we have; very soon the session was lengthened to ten months, and I believe it is now a year and a half for a purely professional course. And professional training, in the meaning usually applied to that expression—training in methods—does not and cannot, alone, occupy the whole and sole consideration in Normal School work. We all know that the purely academic knowledge of a subject, say Arithmetic, which a student has on being graduated from the High School, is not sufficient in *kind* or amount for one who has to present this subject to a class. One of the necessities found by the Normal School staff is a review of academic subjects from the standpoint of one who has to train pupils in these subjects. This necessary review of academic subjects, if properly done—as it should be properly done—will take up a large amount of the master's time in

the Training Schools. Normal School masters sometimes find that inability on the part of a Normal School student to teach a subject well in the Model School arises, not from not knowing *how* to teach, but from not knowing *what* to teach—not knowing the subject sufficiently well from the teacher's standpoint.

2. The last sentence suggests the next change which would make the professional work of the Normal School more efficient. Strictly speaking, it is not a professional change, but it has a bearing on professional work. The standard of scholarship for Junior Leaving should be raised, especially in grammar and arithmetic; or, rather, in the use of the English language and in arithmetic. In these two subjects a minimum of 67 per cent is none too high for a teacher, and should be exacted. There is no concealing the fact that we Normal School masters find our students, with few exceptions, lamentably deficient in a cultured use of the English language. When we come to read the examination papers handed to us, we often find the good effect of a fine comprehension of the matter of the examination paper marred by deficiency in cultured expression. This defect has always been a source of great regret to me—to find the papers of a powerful thinker spoiled, destroyed by errors which should never have survived the Public School course, not to speak of the High School course. This is a weak point, a very weak point, in the qualifications of many of our teachers.

With this efficiency in grammar and arithmetic, a *practical* knowledge of "Science" should be made obligatory among the "non professional" qualifications of the student.

3. This brings me forward to the examination for entrance to the Normal School. This examination has not yet reached its highest degree of usefulness, because in many cases there is not a sufficient amount of time given for preparation. Many students who enter the Normal School do not receive notice until within a few weeks of the opening, and the excuse then offered for non-preparation of the curriculum for the entrance examination is that the notice was so short. In order to make the entrance examination really helpful to the students in the coming Normal School course, (1) those wishing to enter the Normal School, and whose admission is approved by the Education Department, should receive notice at least six months before the opening of the School. Indeed, a year's notice would not be too long. It would give the student-elect time to thoroughly consider why he is about to enter the Normal School, what he will do there, and why he does it. (2) It should be distinctly understood that this examination will not be a mere form, but, like a university matriculation examination, a *rigid test*, the non passing of which bars the student from entrance. (3) And, most important of all, the test of tests must be the language test; that one who proves himself unable to use the English language with grammatical accuracy, with well-regulated construction, and with cultured expression, must not be admitted.

4. The next suggestion is a matter of detail. With a session of ten months long—nine months of "class" work—the first four months should be spent in a thorough review of the subjects of the Public School curriculum, this review being made chiefly from the standpoint of teaching these subjects. That knowledge of school subjects which is best for a teacher to have, and how best to use such knowledge in presenting it to the pupil, should be most carefully considered during this period. With this will, of course, be associated the usual instruction in methods of teaching, and "model lessons." The four months, September to December—the schools opening on the first Tuesday in September—could be profitably spent in this way. Then in the remaining five: January to May inclusive (examinations in June), the student-teachers, thoroughly conversant with *what to teach*, and *how to teach it*, take up their Model School practice with a power which will prove most effective in their work, and most profitable for their own training.

5. The next change in the line of great advantage to the schools is the raising of the standard for professional "pass." Some years ago, the standard which Normal School students were required to reach for graduation was 50 per cent. on practical teaching; 50 per cent on the aggregate of all other subjects, and not less than 34 per cent. on any individual subject of the curriculum. Everyone will grant that this is little enough; but the weak point here was, that if the student did not make 50 per cent. on the two final lessons there was great danger of his being "plucked," even though he had made a brilliant sessional course. Very wisely this state of affairs was changed—in some points, for the better; in others the change is not so good. Now, the standard required for "pass," in the Normal Schools is 50 per cent. on the aggregate of all subjects, including

"teaching," and 34 per cent. on each subject, including "teaching." To my mind 34 per cent. is altogether too low a mark for "pass" in teaching. Why, the County Model School regulations demand much more than this. They say: "Any teacher in training having Primary Standing, who obtains 40 per cent. of the marks assigned to each subject (including practical teaching), and 60 per cent. of the aggregate shall be awarded a third-class certificate, valid for three years." The old plan in the Normal Schools is much better. At present 600 "marks" are allowed for "teaching," as part of the Normal School curriculum. Of these 600 marks, 400 are for award by the Normal School staff, and 200 by the final examiners. According to the present regulations, a student who makes 50 per cent., a very moderate demand on a Normal School student, on the sessional teaching, may actually make a total failure on the final lessons, affording to get zero for each lesson, without risking being "plucked." It may be said (1) that such an extreme case as this cannot possibly occur; that no lesson by a student who has completed his Normal School course can possibly reach so low a grading as zero; speaking from experience, I would say we must not be too sure of this; (2) that if the sessional work "pass" a student, it is of little consequence what value is obtained for the final lessons; that his sessional work being good, he will be a good teacher, no matter what failure he may make of his final lessons. I would not like to view the final lessons in this light. Perhaps a compromise will be best here. Place the marks for "pass" in teaching not less than 50 per cent. on the sessional teaching, and not less than 34 per cent. on the final lessons; but give the principals the old power of saying whether a student who fails to take his 34 per cent. on the final lessons, should be allowed his "pass."

6. The discussion on this last topic naturally leads to the next. The division of labor in the examinations of Normal School students has much in its favor. In the Normal Schools we have three examining bodies: the Normal School staff, the inspectors who preside over the final practical teaching, and the examiners who "set" the papers for the final written examinations, and "read" the answer papers. This, as it were, places a Revising Committee over the decisions of the staff of the Normal Schools A Revising Committee is naturally a good safe-guard; but it is a question whether in the case of the Normal Schools, the graduation of students should not be left entirely in the hands of the Normal School staff, with a distinct understanding that the only rivalry among the Normal Schools shall be which can graduate the best teacher. The Education Department would, of course, continue to prescribe a uniform curriculum for Normal Schools. The Boston Normal School staff has the sole right to decide the graduation of the students of that institution. If the Normal School staffs were the sole authority to grant Normal School diplomas, I have no hesitation in saying that the "weeding out" process would be more extensive than it is now; for the personality of the students, in all that this term implies—that essential quality of which no written examination can give a true record—would receive its proper place in deciding the fitness of a student to take up the immortal work of training the young minds of this growing country of ours.

With these changes I would look for increased usefulness in the School itself, and increased efficiency in the students when, later, they enter on the practical work of their profession.

Yours very sincerely,

JOHN A. MACCABE,
Principal.

Ottawa, 25th Nov., 1901.

III.—PROVINCIAL NORMAL SCHOOL, LONDON.

1. Staff of London Normal School, 1901.

F. W. Merchant, M. A.	Principal.
John Dearness	Vice-Principal.
S. K. Davidson	Drawing Master.
Fred. L Evans	Music Master.
Wm. Gregory	Physical Instructor.
Miss Agnes Mackenzie	Teacher of Kintergarten Principles.

Students Admitted, 1901.

	Male.	Female.
First Session	13	71
Second Session	22	70
Total	35	141

2. Report of Principal Merchant.

To the Honorable Richard Harcourt, M. A., M. P. P., Minister of Education.

Sir,—I have the honor to transmit herewith the Annual Report of the London Normal School for the year 1901.

I have the honor to be, Sir,
Your obedient servant,
F. W. MERCHANT,
Principal.

London, 19th Dec., 1901.

Building, Grounds and Equipment.

The following changes have been made during the year:—

The fitting up of the rooms on the third floor has been completed. The two rooms in the west wing are to be devoted to the Domestic Science Department. One of these is furnished with all modern conveniences as a kitchen and is supplied with all necessary equipment. Three tables are provided at which a class of thirty-six students can do practical work. The room adjoining this is to be used by the class in sewing. The east wing of the third floor will be used for the Museum. Several valuable collections are to be given us as soon as cases are provided.

A gallery has been erected in the Physical Science Lecture Room.

A boiler has been added to the heating plant. We have now sufficient power to heat the building under all conditions of the weather, but the ventilation of the class rooms continues to be very unsatisfactory.

With the exception of the basement and the appliances for ventilation, the building is now complete in all its appointments. The floor of the basement should be cemented and the rooms supplied with Manual Training equipment.

Under the direction of Mr. George W. Rennie, gardener at the Asylum, the grounds at the back of the building have been levelled and seeded. When the work is completed we shall have one of the best athletic parks in the city.

Entrance Requirements.

The present non-professional requirements are unsatisfactory so far as the options are concerned. Many of our students did not in their High School courses take subjects of importance to the Public School teacher. For example, about forty per cent. of the pupils this year had at entrance no knowledge of Botany although they are required in the Normal School to take a course in methods of teaching this subject with the view of preparing themselves to teach it in the upper grades of the Public School and of doing Nature Study work in the lower grades.

The present system of options should be abolished and a fixed non-professional course for teachers adopted. A higher standard in all the subjects embraced in the Public School course should be exacted at the non-professional examination.

The practice of prescribing for the entrance examination to the Normal School a judicious combination of professional and literary reading is a good one; but the works selected, especially those on the professional side, have not always been the most suitable for the purpose. Instead of prescribing such manuals as Seeley's History of Education, which treat of a host of educators and educational systems, it would be better to require entrants to read a work which records the practical experiences of a great teacher or the

principles of a philosophic thinker, or some work of inspiration which has given teachers a nobler and more enlightened view of their calling. Most of our students have read much about such books as Rousseau's Emile or Spencer's Education, and many have prepared for examination purposes analyses of them, but not two per cent. of the students have read the works themselves. Not one student in attendance during one of our terms had read any part of Dean Stanley's Life of Dr. Arnold. Of the general works that have been prescribed, Parkman was found to be the most satisfactory.

There should be a more intimate co-ordination of the county Model School and the Normal School courses. The courses in certain subjects of the Model School, notably that in psychology, are but a poor preparation for the work in the Normal Schools.

No one should be allowed to enter upon the profession of teaching unless in good health, and free from any physical disability or constitutional weakness. Unless in absolute health he cannot successfully teach, or properly control a class of children. Not only will he fail to do justice to his pupils, and to the public who employ him, but the attempt to do his work with any degree of faithfulness will only add to his weakness and hasten the development of disease. This applies especially to persons with a tendency to consumption, dyspepsia, nervous disease, or any constitutional weakness No one should be admitted to a Normal School without a medical certificate of good health; and this certificate should not be in general terms, but should be specific in its details, especially in regard to the conditions above mentioned.

While our sympathy is naturally extended to those who are so unfortunate as to lose their health, yet we must bear in mind that the schools exist not to furnish an occupation to any class, but for the children. Their interests must be our first care.

The Work of the Year.

Within the limitations noted the work of the year has been satisfactory. The students have been most industrious and painstaking, and have applied themselves to the course of study with diligence and enthusiasm. Entrants to the Normal Schools have passed all the various non professional and Model School tests and have served an apprenticeship of from one to three years in a Public School. This training has a tendency to make them most teachable pupils. They have reached a standard of maturity and acquired an experience most valuable as a preparation for future professional study.

The feature most to be regretted in the attitude of Normal School students to their work is their tendency to estimate the value of everything from the bearing it is likely to have on the final examination. So persistently have we in Ontario emphasized in all grades of schools the examination as an end in education that to work for marks has become with students a firmly rooted habit.

Another regrettable feature is their proneness to depend on the teacher for information and for assistance even in trifling difficulties. The will to investigate, or perhaps better the investigating spirit, is wanting on the part of many students. This appears to me to be traceable to "over-teaching," especially in our graded Public Schools and in High Schools and Collegiate Institutes. The teacher is engaged all day with his class in reviewing old topics or in developing new ones, and little opportunity is given pupils of acquiring habits of reflection and investigation. They thus come to look upon the teacher as the natural source from which they are to derive all knowledge.

In these two features our pupils differ markedly from those of the schools I visited in the United States. I never in one of these schools heard examinations referred to either by teachers or pupils, and when not engaged at lectures most of the students are found either in the libraries looking up references and consulting authorities, or at work in the laboratories.

The work undertaken has been mainly that outlined in the syllabus. But we have found it impossible in the short term of four and a half months to cover more than about one-half of this course.

The Ontario Normal School course appears on paper extensive. It embraces most of the centres of interest that have been suggested from which to derive a course of study. But it indicates what should be done rather than what can be done. The following are some of the objects for which time is urgently needed :

1. *A review of the academic studies.*

We have found the students' knowledge of the academic subjects as a rule vague and disconnected. This is a common complaint among Normal School masters both in Canada and the United States. I do not trace the cause, as some do, to poor work in our secondary schools. I am convinced that on the whole our High Schools and Collegiate Institutes do as thorough and as efficient work as may be expected of them. The knowledge acquired by a young student from a study of a subject for the first time is necessarily superficial and indefinite. The student lacks maturity, he is not contemplative, he fails to look at a subject from all sides and to see it in all its bearings. This will always be the case, and we need never expect to find High School graduates saturated with the subjects studied by them.

There is also a necessity for review apart from the indefinitness of the student's knowledge In the Normal School there is a change in view-point. In the High School the end in view is the subject and its value to the student; in the Normal School it is the value of the subject in an educational process and the best mode of presentation to produce the highest results. In the Normal School, therefore, the review should be conducted with direct reference to the teaching process.

By the best arrangement of the time-table which we have been able to make we can give on an average but eight teaching periods during the term to each subject of the Public School course. It will be at once seen that this is altogether inadequate even for the work already prescribed not to speak of the important and necessary academic review that I have just indicated. The present separation between the non-professional and the professional courses of study is based on the false assumption that method can be abstracted from the subject matter and that a few lectures on method should suffice.

2. Nature Study.

The demand for Nature Study is one of the prominent features of present day educational thought. It is advocated on the one hand by all those who from a study of the child recognize that he must be educated through his own activities, and on the other by those who from an investigation of the subject matter of instruction insist upon the inadequancy or unsuitability of mere book knowledge as a preparation for real life under the present social conditions. The term Nature Study has turned out to be somewhat unfortunate, because it has lead to an unwarranted separation of subject matter from method. This is seen in articles in current periodicals and found in text books on the subject where simple information about plants, animals and other natural objects is given with little or no suggestion of that personal investigation by pupils themselves which is the essential character of this movement. Nature Study should be understood to imply the exercise of the child's own observation, his reasoning about the observations made and the expressing of his own conclusions. Pictures and other modes of expression of other people's study of natural or artifical objects should have but a very subordinate place, if any in the nature-study lesson. A complete nature study exercise includes the expression of the thought or conclusion reached by the investigator. Expression should not be confined to a single method. Oral and written language, drawing, modelling and constructive work of various kinds should all be used.

Teachers must be especially prepared to do such work. Indeed the strongest objection to the introduction of Nature study into the public schools has always been that the teachers are not qualified to undertake it. Many of them, as I have already pointed out, have not taken Elementary Science in the High School, and even the formal study of science as it has been carried on in many schools has not proved to be a satisfactory preparation for conducting Nature Study classes. But a beginning must be made, and the general opinion seems to be that the Normal Schools should undertake the work.

We have in the limited time at our disposal given considerable attention to the subject. In the teaching of geography, physiology, agriculture, and elementary science the Nature Study method has been adopted. In connection with the lectures on method in Nature Study, the students are required to make actual investigation of the phenomena connected with the various phases of the environment. For example, among the investigations which the students have, under the direction of Mr. Dearness, undertaken this term may be named, the life history of a plant, less thorough study of three other

plants, the study of two or three species of turtles and snakes, the life history of an insect—the San Jose Scale, the rust of wheat, the changes in its bed made by the river near the school, an object study in physiology, a related series of observations upon the motions of the moon, and a practical comparative study of two minerals. The investigations vary from term to term. The difficulty of finding time for carrying on practical work in a class of one hundred students and of providing the necessary equipment for so many prevents us from making these studies at all exhaustive. In fact, much of what we have accomplished has been done only by taking time for it which is usually devoted to other subjects in themselves important.

3. *The application of the Kindergarden and the Manual Training Ideas.*

The education of the child through his own activities is the prominent feature of modern pedagogical method. In the application of this principle, two classes of schools in part separated from our Public School system have arisen—the Kindergarden and the Manual Training school, and one at the beginning and the other at the end of the Public School course. Although Kindergardens have been established for many years in our cities and larger towns yet the number of pupils in attendance as compared with that entering the lowest grade of Public Schools, is still very small, and Manual Training Departments have been established in connection with but few Public Schools. There appears also no immediate prospect of a rapid increase in the number of these schools. While such an increase is to be welcomed, yet what, in my opinion, we require most in order to give a better training to *all* our pupils is a complete reorganization of the Public School course of study. In the reconstructed course what is valuable in the Kindergarden and Manual Training ideas should be made prominent. This course should take into account the constructive as well as the other activities of the child, not only at the beginning and the end of his formal education, but at all stages of his development. To prepare teachers for carrying on in an intelligent way such work in the Public Schools, the Normal School curriculum should also be reconstructed and brought more into harmony with modern educational ideas.

In the limited time at our disposal we have endeavored to give our students some assistance along these lines. Under the direction of Miss MacKenzie, the lecturer on Kindergarten Principles, they have obtained some practical acquaintance with exercises of the City Kindergarten and Transition classes. Through the kindness of Prof. Robertson and Mr. W. C. Macdonald we have one Manual Training bench. It is a much used piece of furniture. Ladies as well as gentlemen use the saw and knife in constructing certain parts of their Nature Study outfits. Much more might be attempted if we had a row of such benches.

4. Child Study.

Since the child in relation to its environment is central in education it would seem self-evident that the study and interpretation of child life should be one of the chief functions of the Normal School.

In the cource in Psychology and Science of Education we have given some attention to Genetic Psychology. The students have studied the various processes and stages in the mental development of the child and considered departures from normal types and hinderances to normal development. The topics touched upon have been so numerous and the time so brief that I fear even the leading principles of applied psychology too frequently have not become a part of the working experience of the graduates of the school. The work we have attempted has also been too general in character. More time is required for training our students to make specific and individual investigations of the child in such matters as the nature of his imagery, his natural interests and instinctive impulses, and the physical condition of the development of intellectual functions. Especially should our students be better trained to recognize by tests some of the more common bodily hinderances to mental effort.

Extension of the Term.

It is evident from what I have said that the chief barrier to efficient work in Ontario Normal Schools is the shortness of the Normal School Session.

The Committee appointed by the National Educational Association to submit a course of study with a minimum of professional requirements for the State Normal Schools of

the United States, after a careful consideration of the whole question, recommended that the shortest time allowed for the completion of a professional course of study be two years, with the understanding that the applicant for admission has at least a High School education or its equivalent. This committee also recommended that the actual teaching of the students in the Model or Practice Schools should comprise at least five recitation periods per week for one year, preceded and accompanied by directed observations and discussions of actual recitations and their plans.

This report but records the practice in nearly all of the State Normal Schools. Most of these schools have courses extending over at least two years; many of them have a three years' course, and even some, as Bridgewater, Mass., offer a course for the fourth year.

In England the teachers Training Colleges, which correspond to our Normal Schools, have a two years' course of study and many of their pupils have spent an apprenticeship as pupil-teachers in Elementary Schools for four years previous to entrance

In 1877 when the Model School system was organized and all Public School teachers were required to be trained before entering on their duties we took a step in advance of all countries in the matter of the training of teachers. Since that time vast improvements have taken place in the schools for the professional training of teachers in other countries, but in the twenty-four years we have made no substantial change in our facilities for training Second and Third Class teachers. From the nature of the conditions, our schools, both in the scope of the work undertaken and the methods of instruction employed, must be inferior to the best Normal Schools in the United States We cannot in four months do what is done by them in two or three years, and the attempt to pursue the lines of investigation undertaken by them and to keep up with the times, has, by crowding too much work into too short a time, lessened the effectiveness of our methods of teaching

The best that can be said of our system is that we do give some professional training to every Public School teacher, but it is not to our credit that we have remained satisfied with our present requirements for so many years.

Reorganization of Professional Schools.

The time has now arrived when we should take another step in advance. All our teachers should be required to take at least a two years' professional course.

The method of dividing this course of study into two parts, with a period of apprenticeship in actual teaching in the Public School between them, has proved very satisfactory and should be retained. The students come to the Normal School after an actual experience in teaching in a Public School with a clearer idea of their wants and a background of experience exceedingly valuable as a preparation for their course.

The present Model School system should be reorganized on the lines suggested by Mr. J. J. Tilley, Inspector of Model Schools, in his reports. This would amount practically to abolishing the present Model Schools and organizing a new grade of training schools established at convenient centres in the cities and larger towns. By thus lessening the number and making a judicious selection of centres it would be possible to organize much stronger and more efficient schools.

The present Normal School course should be reorganized and the term lengthened to one academic year. The number now seeking admission to the Normal Schools is less than the three schools can accommodate, and it would be two, probably three years, before those applying for admission would be seriously inconvenienced by being kept back When pressure is felt provision can be made for the additional attendance by increasing the staffs of the Normal Schools. The Normal School buildings are large enough to accommodate the increased attendance, and the present scientific equipment and libraries, with the annual additions now made, will suffice. The salaries of the additional teachers would be the only increased expenditure for maintenance. At first it might be necessaay to increase the staff of but one school and the others could be changed as occasion required. Provision also could be made for increasing the capacities of the Model Schools. In London we have found our connection with the Public School system satisfactory, and another Public School could be utilized.

The increase of the staffs of the schools would allow an opportunity for specilization, and the result would be more satisfactory work in every department. Each of our

Normal School masters is at present required to do a greater variety of work than any one man can satisfactorily accomplish. The regulation requiring a specialist in charge of each department in Collegiate Institutes has added greatly to the efficiency of these schools. Our Normal Schools would also be improved by further specialization on the part of the teachers.

Examinations for Professional Certificates.

At present the examinations for professional second class teachers' certificates is conducted partly by the Normal School teachers and partly by a board of examiners appointed by the Education Department. Since the Normal School teachers are given the power of allotting the greater proportion of the marks they may pass whatever candidates they please. While they practically control the examination there is divided responsibility. On the whole, I believe, that it would be better to dispense with the departmental examinations and to hold the Normal School teachers fully responsible for the results.

APPENDIX K.—*ONTARIO NORMAL COLLEGE.*

Report of Dr. J. A. McLellan, Principal.

The Honorable Richard Harcourt, Minister of Education.

Dear Sir,—I have the honor to submit a few facts and remarks about the Ontario Normal College :—

Officers.

J. A. McLellan, M.A., LL.D., Principal.
R. A. Thompson, B.A., Vice-Principal.

Faculty.

J. A. McLellan, M.A., LL.D., Professor of the Psychology, History and Philosophy of Education.
R. A. Thompson. B.A., Lecturer on School Management.
J. T. Crawford, B.A., Lecturer on Methods in Mathematics.
W. M. Logan, M.A., Lecturer on Methods in Classics.
F. F. Macpherson, B A , Lecturer on Methods in Literature and Composition.
S. A. Morgan, B.A., D. Paed., Lecturer on Methods in English Grammar and Rhetoric.
A. Paterson, M.A., Lecturer on Methods in History and Geography.
E. S. Hogarth, B A , Lecturer on Methods in Modern Languages.
J. B. Turner, B.A., Lecturer on Methods in Chemistry, Botany and Zoology.
J. Gill, B.A., Lecturer on Methods in Physics.
J. C. McCabe, M D., Lecturer on School Hygiene and Sanitation.
G. L. Johnston, B.A., Lecturer on Methods in Writing and Drawing.
T. E. Parkhill, Sergeant, XIII. Batt., Drill Instructor.
J. Johnson, Music.
F. F. Macpherson, B.A., Lecturer on Elocution and Reading.

Students admitted, Session 1901-2—Male, 46 ; Female, 67.

Historical Sketch.

The training of teachers for High Schools is one of the many important reforms of recent years. The old opinion was that the possession of a university degree was evidence of qualification for any grade of educational work ; that it would be an imposition to compel a university graduate to pursue a course of training in educational principles and methods in order to become qualified for the greatest of all human callings. Dr. Ryerson, the founder of the system, was not of that opinion. More than forty years ago he established a Model Grammar School for the training of High School masters.

That great man was in advance of his time. He could find nowhere trained teachers for his Model Grammar School. He could get university graduates enough, men of high scholarship and "practical experience," but he could not find men trained in the Science and Philosophy of Education and experienced in the applications of scientific principles to the work of teaching. It need not be said that the Model Grammar School did not succeed. It is somewhat curious that while Psychology is now almost universally admitted to be the essential basis of pedagogical training, nothing was heard of it in the Normal Schools for many years after their establishment. In several of my High School Reports I urged the training of High School Masters, particularly in that of 1882. I again discussed quite fully the question of the training of teachers in 1890. In accordance with these reports the late Honorable Adam Crooks had planned something like a School of Pedagogy in connection with the Toronto Normal School; some of the lecturers for the several departments were actually chosen, when his lamented death put an end to the plan. The Hon. Geo. W. Ross, like his eminent predecessors, thoroughly in accord with the idea of the professional training of the higher class of teachers, established in 1885 what were called the Training Institutes. Four (subsequently six) of the leading Collegiate Institutes furnished graduates and others who had the necessary scholarship the course of training in methods for four months of the year. It was soon felt that students needed a course of training in the Science of Education and in Educational Psychology before the best advantages could be secured from observation and practice teaching. The establishment of the School of Pedagogy in 1890 was the outcome; the removal in 1897 of that institution to Hamilton under its new name, Ontario Normal College, secures the advantage of both features of High School professional training. In the Normal College are combined the benefits of the training institutes as schools for observation and practice, and of the School of Pedagogy as dealing with the Psychology, Science, Philosophy and Art of Education. The facilities are ample for enabling candidates to obtain not only theoretical but practical knowledge of all that pertains to high and public school work. It is the most important step that has yet been taken to accomplish the great and difficult work of training the teachers of the country. The Normal College graduates will become the teachers of the high schools. On the whole better methods of teaching will prevail, and better results in mental discipline will be obtained. In addition to this, as the high schools train academically all the public school teachers, if right methods prevail—and no doubt they generally will prevail—the powerful teaching of example will give those preparing for the profession clear ideas of a rational practice that will form the solid foundation for explicit instruction in rational method.

Course of Instruction.

The course of instruction and training comprehends:

Educational Psychology; The History and Criticism of Educational Systems; The Science and Art of Education, as founded chiefly on the Psychology of the subjects of the curriculum; the Philosophy of Education, involving a comprehensive view of the Nature of Education, the Processes of Education, the Subject Matter of Education (the Organization of the Curriculum) as determined by the changed conditions of modern life; the Method of Education, including the inter-relation of all its factors, End, Processes, and Subject Matter; School Organization and Management; Lectures on Kindergarten Principles and Practice, with criticisms and suggestions in the light of modern Psychology. Lectures with practical illustrations, on the best methods of teaching the subjects in the several departments of Mathematics, English, Classics, Science and Modern Languages; Observation and Practice in the Collegiate Institute and affiliated schools; Criticisms and suggestions upon the practice lessons of the teachers in training. Instruction in Reading and Elocution; Temperance and Hygiene; Writing and Drawing and Vocal Music; Drill, Gymnastics and Calisthenics.

The Staff.

I have to report that the Staff of the Normal College, notwithstanding the limitations and restrictions imposed by their duties in the Collegiate Institute, are doing excellent work. I know a good deal of the courses of practice and training and the quality of

instruction given in similar institutions, and I fully believe that the graduates of the Normal College are at least equal in scholarship and professional training to those of the best institutions on the Continent. All the members of the Staff put both brain and heart into their work; they are thorough masters of the subject-matter; qualified in scholarship for any professor's chair; they have experience in teaching, and the right kind of experience; their knowledge of the science of education has been perfected by successful practice; they have learned to do by knowing and to know by doing; they make every lesson an illustration which really illustrates. In a word, under the circumstances referred to, they do all that can be done to discharge faithfully and efficiently the high duties assigned to them. I regret to add that they do all this for a mere pittance by way of remuneration.

When all the staff merit high praises it may seem invidious to single out one for special mention; but I cannot omit to mention the invaluable assistance I have received from R. A. Thompson, Principal of the Collegiate Institute and Vice Principal of the Normal College. Possessed of an acute mind, strong common sense, a rare genius for management, and enthusiasm united with conspicuous ability, he has contributed very greatly to the success of the College since its removal to Hamilton.

Suggestions for consideration.

(1) Separate Method Papers should be set in French, German and Chemistry in order to meet the just claims of candidates who have selected for their Senior Leaving examination options at present not allowed by the Ontario Normal College Curriculum.

(2) As Primary Science is demanded now from all students, candidates for entrance to the College should be notified to read up that subject before entering the College.

(3) The Options in the College Course should be the same as those for the Senior Leaving Course.

(4) The examination in Latin should be compulsory for all candidates.

(5) The final examination should be abolished altogether. We hold two formal examinations in the College each year; we examine the students in oral and written work day by day and week by week; we give them many a lesson and presentation lesson testing every student's power of thinking and facility of expression; we study in every possible way to know as thoroughly as we can the personality of every student; we are able to report in a week after the final college examination the standing of the students, so that the successful ones are at once ready to make application for vacancies that may occur. The final examination is called the Normal College Examination; if it is retained, the name should be changed; it is not a Normal College Examination at all; it does not test doctrinally or practically the actual work of the College. Men who have never taken the course cannot examine in the course, as could be abundantly shown by a criticism of the papers that have been set from time to time. If the examination is to be retained, only graduates of the College should be appointed examiners; for only graduates know the work and know how to examine in the work. Some of the papers of last year, 1900 1, had some of the marks of pedagogical knowledge because they were set by Normal College graduates. Both staff and students are in favor of doing away with this examination.

If this cannot be done the next best thing is to appoint only Normal College graduates and to insist that the returns be made without unnecessary delay.

(6) I have given my opinion of the efficiency of the staff; of their study of Scientific Method, of their clear and attractive teaching, of their clear presentation of model lessons, at once illustrative of fundamental principles and correct method, of their constant and thoughtful care to do all that can be done for the students individually and collectively, I cannot speak too highly. They deserve liberal remuneration for such work. But, as already said, they do not receive it. I have no hesitation in saying that they do not receive one-fourth of what their services are worth. The Trustees say the fault is with the Government (or Education Department), and the latter, that the blame is with the Trustees. I do not decide between them. But I do say that it is no credit to the Province of Ontario that the highest services in education than can be rendered to the country are so poorly paid. Mr. Johnston, who has charge of the vocal music—a most able and inspiring teacher—has never received one penny for all the valuable instruction he has given. Under such circumstances, I have not the effrontery to ask the members

of the staff to do any extra work, as *e g.* to make special reports on the work in their respective departments, to give now and then a special lecture on important topics in matter and method, to aid by careful study in the revision of the Curriculum, which is now required by the Department, etc., etc. The labourer is worthy of his hire; the labour cannot decently be increased when the hire is unworthy of the labourer.

(7) *An Assistant Urgently Needed.*

There is urgent need of an assistant. A "Master of Method" to supervise the teachers in training, the assigning of lessons, the direction of observation, the criticism of lessons, etc.

Such Master of Method might, too, render some assistance in lectures on Kindergarten principles and practice, in directing the "seminaries" of the students, and in occasional lectures on subjects which the principal cannot possibly overtake. A glance at the detailed course of study—which has been enlarged since the College came to Hamilton—will show it to be simply impossible for one man to do all the work required. A comparatively small outlay would be sufficient, and the efficiency of the College would be very greatly increased. This is the opinion of Mr. Thompson and of the entire staff.

Psychology the Basis of Normal Training.

While Psychology is made the basis of the Normal College course, only such of its principles as bear directly upon education are considered. But little time is given to purely metaphysical questions, or unsettled problems. It appears to be thought in some quarters that there is too much time given to Psychology. A President of a College delivering an address in Halifax, before the Dominion Educational Association, left this impression of too much Psychology; and a certain professor made similar statements in Montreal last summer before the same Association. Neither of these men ever visitod the College Their statements are the outcome of ignorance or prejudice or both. The aim of the College—its spirit and method—is expressed in its motto, "LEARN TO DO BY KNOWING AND TO KNOW BY DOING," which the noted American Commissioner of Education, Dr. Harris, declared to be at once a comprehensive and philosophical conception of education. Psychology is taught in its applications. There is little abstract discussion of Attention, Association, Imagination, etc. They are taught as expressed in products of the mind. At all events psychology is essential as a basis for the training of the teacher and for a sound discussion of Educational problems. Even a good definition of education is impossible without such a basis. Take the one-sided definition of the sticklers for so-called practical education which one-eyed seers tell us has nothing to do with psychology: education is preparation to make a living; it is to make a good citizen, etc. And they prescribe a curriculum for us: a little language and literature, a little geography and sociology, a little mathematics and science, a little manual training. This is plausible—it does not seem to demand any psychology for the teacher. But a moment's reflection reveals its weakness. First of all what and where is this Geography—this Arithmetic—this History, etc.? They are not things to be stumbled upon as mere physical things which may be bestowed upon the child. Does Geography, Arithmetic, etc exist anywhere outside of some human mind? Their ideas enter into the very constitution of human society. As such they are too abstract, too general; they cannot be brought into direct contact with the child's mind. Education, says Dr. Dewey, has to do two things; it has to extract these ideas out of this general experience, sum it up and re-arrange it in scientific order, and then translate it into the child's experience. The ultimate test of the worth of ideas of Arithmetic, Physics, Manual Training, etc, is that they be worked over in the child's experience in such a way as to become part and parcel of himself, lifting him from the mere sensuous or animal life, into the humanized, socialized life, the life of self-control, which is the end of all education. This adaptation of the subject matter of the curriculum to the consciousness of the child, means that every subject has to be *psychologized* If there is no Psychology of Arithmetic, Psychology of Geography, Psychology of Grammar, etc., there can be no science of education; and our training schools sink from the scientific to the empirical, using the half truth of primitive man: LEARN BY DOING; *i. e.* hear and obey; observe and imitate. This psychologizing of subjects, includes, of course, manual training as well as the more academic branches. For skill of hand is the expression of cunning of brain; or briefly, hand craft is the expression of brain-craft.

If this is true, if the child's mind works in a certain way in appropriating material presented to it, and if the material has to be wisely adapted to this mental movement of the chiid, no long examination is needed to show how far short of a possible ideal are most of the text-books now used in the schools.

Some further remarks on the worth of Psychology may be permitted, especially as the question seems to be less firmly settled in Canada than it is in America and Europe.

The value of any fact or theory as bearing on human activity is, in the long run determined by the practical application of it, that is, by using it for acomplishing some definite purpose. If it works well, if it removes friction, frees activity, economizes effort, makes for richer results—it is valuable as contributing to a perfect adjustment of means to end. If it makes no such contribution it is practically useless, no matter what claims may be theoretically urged in its behalf. To this principle the question of the relation between psychology and education presents no exception. The value of a knowledge of psychology in general, or of the psychology of a particular subject, will be best made known by its fruits. No amount of argument can settle the question once for all and in advance of any experimental work. But, since education is a rational process, that is a process in harmony with the laws of psychical development, it is plain that the educator need not and should not depend upon vague inductions from a practice not grounded upon principles. Psychology cannot dispense with experience, nor can experience, if it be rational, dispense with psychology. It is possible to make actual practice less a matter of mere experiment and more a matter of reason; to make it contribute directly and economically to a rich and ripe, because rational, experience. And this the educational psychologist attempts to do by indicating in what directions help is likely to be found; by indicating what kind of psychology is likely to help and what is not likely; and finally, by indicating what valid reasons there are for anticipating any help at all.

As to the last point suggested, that psychology *ought* to help the educator, there can be no disagreement. In the FIRST PLACE the study of psychology has a high *disciplinary* value for the teacher. It develops the power of connected thinking and trains to logical habits of mind. These qualities, essential though they are in thorough teaching, there is a tendency to undervalue in educational "methods" of the present time when so much is made of the accumulation of facts and so little of their organization. In our eager advocacy of "facts and things" we are apparently forgetting that these are comparatively worthless, either as stored knowledge or for developing power, till they have been subjected to the discriminating and formative energy of the intellect. Unrelated facts are not knowledge any more than the words of a dictionary are connected thoughts. And so the work of getting "things" may be carried to such an extent as to burden the mind and check the growth of its higher powers. There may be a surfeit of things with the usual consequence of an impaired mental digestion. It is pretty generally conceded that the number of facts memorized is by no means a measure of the amount of power developed; indeed, unless reflection has been exercised step by step with observation, the mass of power gained may turn out to be inversely proportional to the multitude of facts. This does not mean that there is any opposition between reflection and true observation. There can not be observation in the best sense of the word without reflection nor can reflection fail to be an effective preparation for observation. In fact, "things"—which we hear so much about to-day—are not facts of science or even facts of knowledge. They must become things *thought* and expressible in words in order to become even the raw materials of science.

It will be readily admitted that this tendency to exalt facts unduly may be checked by the study of psychology. Here, in a comparatively abstract science, there MUST be reflection—abstration and generalization. In "nature study" we gather the facts, and we MAY reflect upon the facts; in mind study we must reflect in order to get the facts. To observe the subtle and complex facts of mind; to discriminate the elements of a consciousness never the same for two successive moments; to give unity of meaning to these abstract mental phenomena demands such concentration of attention as must secure the growth of mental power—power to master, and not to be mastered by, the facts and ideas of whatever kind which may be crowding in upon the mind; power to resolve a complex subject into its component parts, seizing upon the most important and holding them clearly defined and related in consciousness; power, in a word, to take any "chaos" of experience and reduce it to harmony and system. This analytic and relating power,

which is an essential mark of the clear thinker, is the prime qualification of the clear teacher.

But, in the SECOND PLACE, the study of psychology is of still more value to the teacher in its bearing upon his PRACTICAL or strictly professional training.

Every one grants that the primary aim of education is the training of the powers of intelligence and will—that the object to be attained is a certain quality of character. To say that the purpose of education is "an increase of the powers of the mind rather than an enlargement of its possessions;" that education is a science, the science of the formation of character; that character means a measure of mental power, mastery of truths and laws, love of beauty in nature and in art, strong human sympathy, and unswerving moral rectitude; that the teacher is a trainer of mind, a former of character; that he is an artist above nature, yet in harmony with nature, who applies the science of education to help another to the full realization of his personality in a character of strength, beauty, freedom—to say this is simply to proclaim that the problem of education is essentially an ethical and psychological problem. This problem can be solved only as we know the true nature and destination of man as a rational being, and the rational methods by which the perfection of his nature may be realized. Every aim proposed by the educator which is not in harmony with the intrinsic aim of human nature itself, every method or device employed by the teacher that is not in perfect accord with the mind's own workings, not only wastes time and energy, but results in positive and permanent harm; running counter to the true activities of the mind, it certainly distorts and may possibly destroy them. To the educator, therefore the only solid ground of assurance that he is not setting up impossible or artificial aims, that he is not using ineffective and preverting methods, is a clear and definite knowledge of the normal end and the normal forms of mental action. To know these things is to be a true pyschologist and a true moralist, and to have the essential qualifications of the true educationist. Briefly, only psychology and ethics can take education out of its purely empirical and rule-of-thum stage where it has been for many a year. Just as a knowledge of mathematics and mechanics has wrought marvelous improvements in all the arts of construction; just as a knowledge of steam and electricity has made a revolution in modes of communication, travel and transportation of commodities; just as a knowledge of anatomy, physiology, pathology has transformed medicine from empiricism to applied science, in a word, just as in any realm of human experience, knowing has aided doing, so a knowledge of the structure and functions of the human being can alone elevate the school from the position of a mere workshop, a more or less cumbrous, uncertain and even baneful institution to that of a vital, certain and effective instrument in the greatest of all constructions—the building of a free and powerful character.

Without the assured methods and results of scientific thought there are three resources available in the work of education.

The first is NATIVE TACT AND SKILL, the intuitive power that comes mainly from sympathy. For this personal power there is absolutely no substitute. "Any one can keep school," perhaps, but not every one can teach school any more than any one can become a capable painter, or an able engineer, or a skilled artist in any direction. To ignore native aptitude, and to depend wholly, or even chiefly, upon the knowledge and use of "methods," is an error fatal to the best interests of education; and there can be no question that many schools are suffering frightfully from the malady of method, from ignoring or undervaluing this paramount qualification of the true teacher. But in urging the need of pyschology in the preparation of the teacher there is no question of ignoring personal power, or of finding a substitute for personal magnetism. It is only a question of providing the best opportunities for the exercise of native capacity—for the fullest development and most fruitful application of endowments of heart and brain. Training and native outfit, culture and nature, are never opposed to each other. It is always a question, not of supressing or superseding, but of cultivating native instinct, of training natural equipment to its ripest development and its richest use. A Pheidias does not despise learning the principles necessary to the mastery of his art, nor a Beethoven disregard the knowledge requisite for the complete technical skill through which he gives expression to his genius. In a sense it is true that the great artist is born, not made; but it is equally true that a scientific insight into the technics of his art helps to make him And so it is with the artist teacher. The greater and more scientific his know-

ledge of human nature, the more ready and skilful will be his application of principles to varying circumstances, and the larger and more perfect will be the product of his artistic skill. Nature and nurture will make the perfect artist.

But the genius in education is as rare as the genius in other realms of activity. Education is, and forever will be, in the hands of ordinary men and women; and if psychology—as the basis of scientific insight into human nature—is of high value to the few who possess genius, it is indispensable to the many who have not genius. Fortunately for the human race, most persons though not "born" teachers, are endowed with some "genial impulse," some native instinct and skill for education; for the cardinal requisite in this endowment is, after all, sympathy with human life and its aspirations.

We are all born to be educators, to be parents, as we are not born to be engineers, or sculptors, or musicians, or painters Native capacity for education is therefore much more common than native capacity for any other calling. Were it not so human society would not hold together at all. But in most people this native sympathy is either dormant or blind and irregular in its action; it needs to be awakened, to be cultivated, and above all to be intelligently directed. The instinct to walk, to speak, and the like are imperious instincts, and yet they are not wholly left to "nature"; we do not assume that they will take care of themselves; we stimulate and guide, we supply them with proper conditions and material for their development. So it must be with this instinct, so common yet at present so comparatively ineffective, which lies at the heart of all educational efforts, the instinct to help others in their struggle for self-mastery and self-expression. The very fact that this instinct is so strong, and all but universal, and that the happiness of the individual and of the race so largely depends upon its development and intelligent guidance, gives greater force to the demand that its growth may be fostered by favorable conditions; and that it may be made certain and reasonable in its action, instead of being left blind and faltering. as it surely will be without rational cultivation.

To this it may be added that native endowment can work itself out in the best possible results only when it works under right conditions. Even if scientific insight were not a necessity for the true educator himself, it would still remain a necessity for others in order that they might not obstruct and possibly drive from the profession the teacher possessed of the inborn divine light, and restrict or paralyze the efforts of the teacher less richly endowed. It is the mediocre and the bungler who can most readily accommodate himself to the conditions imposed by ignorance and routine; it is the higher type of mind and heart which suffers most from its encounter with incapacity and ignorance. One of the greatest hindrances to true educational progress is the reluctance of the best class of minds to engage in educational work precisely because the general standard of ethical and psychological knowledge is so low that too often high ideals are belittled and efforts to realize them even vigorously opposed. The educational genius, the earnest teacher of any class, has little to expect from an indifference, or a stolidity, which is proof alike against the facts of experience and the teachings of science

The second resource is EXPERIENCE. This again is necessary. Psychology is not a short and easy path that renders personal experience superfluous. The real question is: What kind of experience shall it be? It is in a way perfectly true that only by teaching can one become a teacher. But any and every sort of thing which passes for teaching or for "experience" will not make a teacher any more than simply sawing a bow across violin strings will make a violinist. It is a certain quality of practice, not mere practice, which produces the expert and the artist. Unless the practice is based upon rational principles, upon insight into facts and their meaning, "experience" simply fixes incorrect acts into wrong habits, forms a second nature without a trace of the vision and faculty divine of the true artist Non-scientific practice, even if it finally reaches sane and reasonable results—which is very unlikely—does so by unnecessarily long and circuitous routes; time and energy are wasted that might easily be saved by wise insight and direction at the outset.

The worst thing about empiricism in every department of human activity is that it leads to a blind observance of rule and routine. The mark of the empiric is that he is helpless in the face of new circumstances; the mark of the scientific worker is that he has power in grappling with the new and the untried; he is master of principles which he can effectively apply under novel conditions. The one is a slave of the past, and the other is a director of the future. This attachment to routine, this subservience to empiric

formula, always reacts into the character of the empiric ; he becomes hour by hour more and more a mere routinist and less and less an artist. Even that which he has once learned and applied with some interest and intelligence tends to become more and more mechanical, and its application more and more an unintelligent and unemotional procedure, It is never brightened and quickened by adaptation to new ends. The machine teacher, like the empiric in every profession, thus becomes a stupefying and corrupting or paralizing influence in his surroundings ; he himself becomes a mere tradesman, and makes his school a mere machine shop ; he works with numb rigidity towards a mere mechanical end.

The third resource is AUTHORITATIVE INSTRUCTION IN METHODS AND DEVICES. At present, the real opposition is not between native skill and experience on the one side, and psychological methods on the other; it is rather between devices picked up no one knows how, methods inherited from a crude past, or else invented, *ad hoc*, by educational quackery—and methods which can be rationally justified—devices which are the natural fruit of knowing the mind's power and how it works and grows in assimilating its proper nutriment. The mere fact that there are so many methods and devices current, and constantly pressed upon the teacher as the acme of the educational experience of the past, or as the latest and best discovery in pedagogy, makes an absolute demand for some standard by which they may be tested Only knowledge of the principles upon which all methods are based can free the teacher from dependence upon the educational nostrums which are recommended, like patent medicines, as panaceas for all educational ills. If a teacher is one fairly initiated into the real workings of the mind, if he realizes its normal aims and methods, false devices and schemes can have no attraction for him ; he will not swallow them as silly people swallow empiric's "pills;" he will reject them as if by instinct. All new suggestions, new methods, he will submit to the infallible test of science ; and those which will further his work he can adopt and rationally apply, seeing clearly their place and bearings, and the conditions under which they can be most effectively employed. The difference between being overpowered and used by machinery and being able to use the machinery is precisely the difference between methods externally inculcated and methods freely adopted, because of insight into the psychological principles from which they spring.

Summing up, we may say that the teacher requires a sound knowledge of ethical and psychological principles—first, because such knowledge, besides its indirect value as forming logical habits of mind, is necessary to secure the full use of native skill; secondly because it is necessary in order to attain a perfected experience with the least expenditure of time and energy; and thirdly, in order that the educator may not be at the mercy of every sort of doctrine and device, but may have his own standard by which to test the many methods and expedients constantly urged upon him, selecting those which stand the test and rejecting those which do not, no matter by what authority or influence they may be supported.

J. A. McLELLAN,
Principal.

Hamilton, 14th Jan. 1902.

APPENDIX L.—*THE ONTARIO LIBRARY ASSOCIATION.*

Minutes of Proceedings.

Toronto, April 8th, 1901.

The first session of the first meeting of the Ontario Library Association was called to order this afternoon by Mr. Jas. Bain, jr., in the Examiners' Room of the Education Department.

Mr. Bain, in a brief introductory speech, referred to the origin of the Association. The Canadian delegates at the meeting of the American Library Association in Montreal last June had felt the advisability of taking some steps to organize those in Canada who were interested in library work, and this meeting was the outcome.

Moved by Mr. Lancefield, seconded by Mr. Blackwell, that the present provisional officers be confirmed till to-morrow. Carried.

The Secretary read the Constitution as drafted by Provisional Executive.

The delegates present signed the roll, and their names were read out

Constitution was then discussed as adopted with two changes :—

Ten members instead of twenty to call a special meeting.

Ten members instead of twenty to be a quorum for meeting.

The Constitution as a whole, with these two amendments, was adopted on motion of Messrs. Blackwell and Eakins

Mr. R T. Lancefield, Hamilton Public Library, read his paper on "Modern Library Methods and Appliances for a Small Library."

Discussion followed by Messrs. Robertson, Blackwell, Hardy, Bain and Miss McCallum.

Mrs. Keller's paper on "The Character of Books for a Small Library" was read by Mr. M. L Nutting, Secretary Uxbridge Public Library.

Discussion followed by Messrs. Bain, Horning, Robertson, Tytler, Nutting, Blackwell, Langton, and McWilliams.

A Nominating Committee of Messrs. Bain, Lancefield and Hardy was appointed.

Meeting closed about 5 p m.

April 8, 1901.

The evening session was held in the theatre of the Education Department.

Mr. Bain occupied the chair.

Secretary read letters of regret from Hon. R. Harcourt and Hon. G. W. Ross regretting inability to be present, and letters from Mr. Henry J. Carr, of American Library Association, and Mr. Melvil Dewey, of New York State Library, expressing congratulation to the Ontario Library Association.

Mr. Bain gave the opening paper of the evening on "The Library Movement in Ontario."

Mr. John Millar, Deputy Minister of Education, in the absence of the Minister of Education, extended a hearty welcome to the association, expressing his deep sympathy with the movement and his hope that it would contribute to the best development of library work in Ontario.

Mr. Langton, of the University of Toronto Library, read a paper on "Canadian History"

Mrs. Harrison (Seranus) in place of a paper on Canadian Fiction read a paper on "The Influence of Scenery upon Character."

Mr. C. C. James, Deputy Minister of Agriculture, read a paper on "Canadian Poetry"

The meeting then adjourned

Tuesday, April 9th, 1901

The third session opened this morning with President Bain in the chair.

The Nominating Committee presented their report, which was adopted.

The following were elected officers for 1901-1902 :—

President, Jas. Bain, Jr., Esq., Public Library, Toronto.

First Vice-President, H. H. Langton, B. A., University of Toronto Library, Toronto.

Second Vice-President, R J. Blackwell, Public Library, London.

Secretary, E A. Hardy, B A, Public Library, Lindsay.

Treasurer, Dr. A. B. MacCallum, Canadian Institute, Toronto.

Councillors: W. Tytler, B.A., Public Library, Guelph; R. T. Lancefield, Public Library, Hamilton; Avern Pardoe, Legislative Library, Toronto; Judge McDonald, Public Library, Brockville; Henry Robertson, Public Library, Collingwood.

Moved by Prof. Horning, seconded by Mr. Neilson, that a committee on Library Architecture be appointed by the Executive.—Carried.

Moved by Prof. Horning, seconded by Mr. Neilson, that a committee be appointed by the Executive to issue lists of books from time to time, to serve as guides to our libraries.—Carried.

Miss Budge's (Port Hope) paper on "The needs of the small Library" was read by the secretary.

Discussion followed by Miss McCallum, Miss Chown, and Messrs. Brown, Steel, Bain and Tytler.

Mr. Neilson (Ayr) raised the question as to a Board's action in regard to persons suffering from infectious diseases, especially consumption. Should they be forbidden the reading room?

In reply Mr. Bain said that while the Toronto Board took every precaution regarding books known to be in places of infectious disease The result of the investigations of the American and British Library Associations went to prove that the transmission of disease by library books was almost unknown.

Mr. Blackwell said that there could be no legal restriction upon consumptives visiting the rooms.

Mr. Hardy read his paper on "An outline programme of the work of the Ontario Library Association."

Discussion followed, largely shared in

Moved by Mr. Blackwell, seconded by Mr. Neilson, that the government be asked to publish as a government pamphlet the full proceedings of the Association.

Moved in amendment by Mr Tytler, seconded by Mr. Robertson, that the publication of the papers be left with the Executive Committee.—Amendment Carried.

Mr. Bain took occasion to speak of the value of files of papers and of sets of periodicals and of the great utility of Poole's Index and the Abridged Index.

Mr. Burton (Hamilton) supported Mr. Bain, speaking of value of newspaper files from a legal point of view. Mr. Burton assured the Association of the hearty co-operation of Hamilton.

Prof. MacCallum (Canadian Institute) read his paper on "Travelling Libraries." The paper was discussed by Messrs. Lancefield, Deputy Minister Millar, Tytler, Brown, Steele, and Miss McCallum.

Mr A.H Gibbard's paper (Whitby) on "The Library and the School," was read by Mr. Brown of Whitby Public Library.

Moved by Mr. Langton, seconded by Mr. Robertson, that the thanks of the Ontario Library Association be tendered to the Minister of Education and the Deputy Minister for their sympathy and co operation with the Association.—Carried.

Moved by Secretary Hardy, seconded by Mr. Robertson, that this Association express its thanks to Mrs Harrison and Mr. C. C. James for their papers last evening.

Moved by Mr. Robertson, seconded by Prof McLaughlin, that a special committee consisting of president, secretary and Mr. Lancefield be appointed to take into consideration the question of a better classification of books with a view to securing a greater uniformity than now exists, said committee to report at the next annual meeting of this Association.—Carried.

The president then declared the first convention of the Ontario Library Association closed.

APPENDIX M—*REPORT ON PUBLIC LIBRARIES VISITED BY DR. S. P. MAY IN NEW YORK, PHILADELPHIA AND BUFFALO.*

New York.—The City of New York has a large number of Free Circulating Libraries. In addition there is a library in every public school; the School Board has the management and expenditure of the revenues received for school libraries from the State and City of New York. The books for school libraries are selected from lists prepared by the Borough Boards of Superintendents. These lists are submitted to the City Superintendent of Schools, and certified by him to the State Superintendent of Public Instruction.

The lists of books include reference books, supplementary reading books (books that cultivate a taste for good reading) and books relating to branches of study pursued in the schools; also books especially designated as aids to teachers. Books not needed for reference may be circulated among the teachers and pupils for home reading No pupil is allowed to take more than one book at a time, which cannot be retained for a period longer than one week.

School libraries are open to teachers during school hours and open to pupils twice a week.

When a school library has over 500 volumes the Board of Education may appoint a librarian at such salary as the Board may deem expedient.

It is also the duty of the Committee on Libraries to make rules to extend the use and benefit of the Travelling Libraries of the Free Libraries of the several boroughs.

The Superintendent informed me that the grant voted by the city for school libraries this year is $25,000.

Strenuous efforts are being made to combine all free circulating libraries under one central administration. A plot of ground valued at $3,000,000 has been set apart for the Public Library, and a building is to be erected at the cost of three quarters of a million dollars.

I had not time to visit all the Free Libraries, but on the recommendation of the City Superintendent of Education visited the libraries of the Aquilar Free Library Society. This society has four Free Libraries and twenty-six Travelling Libraries. The expenditure in 1900 was $63,147.52; appropriation from the City of New York, $38,041.67; received for fines and sales of library lists, $1,034.39; total revenue, $71,296 39; number of books in libraries, 76,530. The proportion of fiction loaned was 64 per cent. for the four Libraries, and 70 per cent. for the Travelling Libraries.

The amount paid for salaries in 1900 was $18,753.

They have a Children's Department, which, they say, is very successful, and proved a great boon, encouraging children to respect books, and directing their attention to the best books for them to read. They co-operate with the public schools; in fact, all the branch libraries (with the exception of four) are sent to public schools.

They have recently introduced the open-shelf system, by which readers are allowed to select their books from the shelves. The chief librarian reports that the results so far are satisfactory, and that the comparative loss due to the disappearance of books is slight in comparison to the advantages for readers, as heretofore they had to wait in line to be served, and they would often be disappointed at not finding the book they desired.

PHILADELPHIA.—The Central Free Library is in a rented building on 12th and Chestnut Streets; they are very much cramped for room, and the board is agitating to get a building erected The people recently showed by vote that they are ready to give a million dollars for that purpose.

There are 15 Branch Libraries, and 95 Travelling Libraries, equipped with 234,221 volumes.

The total number of volumes circulated was:

General Works	11,539
Philosophy	9.383
Religious	14,023
Sociology	74 490
Philology	3,261
Natural Science	30 582
Useful Arts	19.851
Fine Arts	24,631
Literature	101,343
History	54 310
Travels	42,936
Biography	45,702
Fiction	1,394,568
	1,826,637

The total volumes issued represented:

Free Library and 15 Branches	1,798,235
Department for the Blind	2,326
95 Travelling Libraries	26 076
Total	1,826,637

The proportion of works of Fiction issued was over 76 per cent.

Receipts for 1900, $176,674.93. The expenditure for the year was $167,422.40, which included $66,857.35 for salaries, and $47,332.44 for books. In addition two

gentlemen contributed $31,350.00 for books, making the total amount paid for books in 1900 $78,682.44. They received $2,596.47 for fines, etc.

Buffalo Public Library.—The expenditure of this Library is more than double the Legislative Grant for over 400 Libraries in Ontario. The expenditure in 1900 was $90,557.39. The grant from the City is four fifths of one hundredth of one per cent. of the assessed valuation, amounting in 1900 to $78,615.88.

The Library contains 165,960 books. The percentage of circulation for 1900 was as follows:—

Magazines	.013
Philosophy	.008
Religion	.009
Sociology	.014
Philology	.001
Science	.036
Useful Arts	.019
Fine Arts	.016
Literature	.096
History	.055
Travels	.037
Biography	.025
Fiction	.671
	1,000

The Superintendent in his Report says "The fiction percentage, 67 per cent., is a slight decrease from the year before. Any figure between 65 and 70 per cent. is considered normal."

They have a staff of 81 persons whose salaries amounted to $42,092.29.

Schoolroom Libraries.—They have an excellent system of Classroom Libraries in Public Schools; thirty schools are supplied with 459 separate Classroom Libraries, containing 20,346 books. These libraries are giving great satisfaction. The principal of one of the schools says, "The moral tone of this district has been changed for the better since his school has had books from the Public Library."

Travelling Libraries.—They have 108 Travelling Libraries, containing 3,131 volumes, which were sent to High Schools, Literary Clubs, Fire and Police Departments, etc.

Open Shelf Department.—Persons are allowed to select their own books in this department; it involves increased labor and expense for extra assistants.

They are very strict in the management of the Library; the fines amounted to $2,840.65 in 1900.

Remarks.—It is gratifying to state that the Public Libraries in Ontario are conducted at much less cost than the Libraries in the United States. For example, on the 1st January, 1900:

New York.—4 Libraries and 26 Travelling Libraries loaned 672,103 books. Expenditure, $63.147.52

Philadelphia.—16 Libraries and 95 Travelling Libraries loaned 1,826,637 books. Expenditure, $167,422.40.

Buffalo.—1 Library, 30 School Libraries and 108 Travelling libraries loaned 981,235 books. Expenditure, $90 557.39.

This shows that 280 Libraries, viz, 21 Libraries, 30 School Libraries and 229 Travelling Libraries issued 3,479,975 books. Total expenditure, $321,127.31.

Ontario—371 libraries loaned 2,043,904 volumes.

Open-Shelf System.—This would not be successful in Ontario; it would require too many assistants, and I am pleased to say that in nearly all our libraries the public are not allowed access to the shelves. It will be noticed, that in Buffalo they have 81 employees, salaries $42,092 29.

Fiction.—The proportion of fiction issued in the United States is much higher than in Ontario.

Children's libraries in free libraries, and school libraries, cannot be too much commended; when inspecting libraries I always try to impress upon the officials the necessity

of encouraging the young to read books that will give them information which will be useful to them in after life, and give them a kind of post-graduate education after leaving school.

Fines.—The libraries in the United States are stringent in their rules for return of books, and derive quite a revenue from fines. In Ontario this rule could be enforced in free libraries, but in libraries subscribed for by members it is impracticable, as the enforcement of fines would induce members to withdraw their support.

Missing Books.—The rule in the United States free libraries is for the loser to pay the price of the missing book. In some of our free libraries, in addition of the cost of replacing book, the authorities demand the amount forfeited for fines; so that a person who has neglected paying for a missing book may have to pay $2 00 or $3 00 for a dollar book. I do not think that this could be legally enforced, and have advised boards where the matter has been discussed to charge for the missing book only.

APPENDIX N.—*REPORT ON ART SCHOOLS, DRAWING IN PUBLIC SCHOOLS, ETC., VISITED BY DR S. P. MAY, IN NEW YORK, PHILADELPHIA, AND BUFFALO.*

NEW YORK.—The Cooper Union for the Advancement of Science and Art is one of the grandest institutions on this Continent. It has an endowment of $30,000 per annum, but the expenditure cannot be reduced below $70,000 per annum, the deficit being made up at the end of the current year by the Trustees. During the year 1900 $40,000 was contributed to the endowment fund. Ultimately the income of the trust fund, created by the children and grandchildren of Peter Cooper, will supply all deficiencies. Revenue, for 1900, $104 282 96

They have an excellent museum, reading room, library, etc., and free day and evening classes in Science and Art. I shall only refer to the Art classes.

The Cooper Union was intended by the founder for the education of young people who are engaged in earning their livelihood during the day. It is planned to supplement the education given in the Public and High Schools.

The conditions for admission to the night classes require a knowledge of such branches as may be studied in the night schools of the Board of Education, and for admission to the day classes the graduating diploma of one of the High Schools is a sufficient qualification.

Free Night Schools of Art.—The term commences in September and ends in May. Applicants must be at least 15 years of age. Applications last term, 2,977. Admitted, 2,184.

Subjects Taught.

Rudimentary drawing for beginners in freehand drawing from models.
Form drawing—freehand in bas-relief, etc.
Cast drawing—drawing from the antique.
Decorative designing—designs for paperhangings, fresco work, textile fabrics etc.
Ornamental drawing—drawing from copies of ornamental form.
Modelling in clay—for workers in relief decoration in terra-cotta, marble, etc.
Architectural drawing.
Mechanical drawing.
Perspective drawing.

Free Art School for Women,—The term commences October and ends in May. Applicants must be at least 16 years of age. Applicants last term 474. Admitted 295.

SUBJECTS TAUGHT.

Art Classes.

Elementry drawing from casts.
Drawing from the antique.
Life drawing.
Oil painting—Two years course.
Modelling in clay.
Industrial classes.

Industrial classes.

Classes in design—Two or three years course.
Classes in decorative composition,—Two years course.
Illustrating class.
Retouching of positives.
Water colors, crayons, etc.
Porcelain painting from life.
Pastel and mural painting from life.

The museum is an important adjunct in connection with teaching Industrial and Decorative Art. Representatives of various trades in connection with the Arts also have the privilege of using the museum. The Museum contains a large collection of celebrated European decorations of the various styles of past centuries, a large number of Encyclopaedic Scrap books, Reference books, Illustrated books, Photographs, Reproduction of Prints in the British and Berlin museums, etc. The Museum is used as a sort of atelier for pupils and the public under the supervision of teachers. The Trustees have recently been informed that Mr. J. Pierpont Morgan has contributed to the museum three of the most valuable collections of textile fabrics to be found in Europe. They say that Decorators and Designers frequently work up some plan, or scheme, inspired by the museum, and sometimes designers accompany patrons to the museum to consult with them on the style of decorations for their houses, costumes, etc

The Trustees have arranged for an advanced day course in Decorative Art in connection with the Art Museum for students who already have some knowledge of the orders of architecture, and can draw from the cast, etc.

In all the classes of the Art Department pupils furnish their own material, instruments, etc., but tuition is free.

PHILADELPHIA.—SCHOOL OF DESIGN FOR WOMEN.—This is the oldest and largest institution of its kind in the United States. It was founded in 1844 by Mrs. Sarah Peter, wife of the British Consul at Philadelphia. It was incorporated in 1853, is the pioneer school for teaching Industrial Art in the United States and antedates the incorporation of the South Kensington School in London, England.

The Trustees own a magnificent building on the corner of Broad and Master Streets, which cost over $100,000. They have sixteen class rooms and studios, large lecture room, library, and museum, which contains oil and water color paintings, engravings, works of art, models of statuary, photographs, studies in architecture, ornamental and practical designs, and a large collection of examples of oriental art..

The primary intention of the founder was to give women a thorough and systematic instruction in practical designing as applied to manufactures. This object has been broadened and now includes all branches of study which have a business value.

The courses of study are as follows :—

Class A.—Normal Art Course for training teachers.

First year.—Charcoal drawing from geometrical solids, with applied perspective. Lead pencil drawing from flowers, foliage. etc. Drawing from still life; brush drawing in sepia from casts and still life, etc; memory drawing; time sketches; applied perspective; design.

Second year.—Antique, modelling, water color, antique and still life in oil.

Third and Fourth years—Life class, modelling, water color, still life in oil.

Class B.—Theoretical and technical design. (To enter this class a good drawing must be submitted.)

The course of study (two years) includes instruction in the historic styles and principles of ornament, conventional analysis of plants and original designs applied to all the industrial arts. Technical methods employed in weaving textile fabrics are studied. The pupils of this class visit the mills of some of the prominent manufacturers and thus obtain a practical knowledge of the application of designs

Special classes in the following subjects are also conducted :—1. Landscape. 2. Composition, etching. 3. Antique, portrait, anatomy, composition. 4. Life class. 5. Modelling from casts and life. 6. Still life and flowers in oil. 7. Water colors. 8. Illustrations.

Terms of tuition :—

Normal Art Course—first year	$20.00 per term.
Normal Art Course—succeeding years	25.00 "
Special Classes	25 00 "

There are two school terms in each year.

Fellowships and diplomas are conferred, and through the liberality of two gentlemen two European fellowships are conferred for proficiency in the designing classes, giving the fortunate students a year's study in the great Art Schools and Galleries of London, Paris and other European cities.

Spring Garden Institute.—Although not the largest, this Institute claims to be the first Technical School in the United States. It was established in 1851, when they borrowed $5,000 from the Young Man's Institution to erect a building on a plot of ground presented to them so that they might open a night school in drawing for men and boys. They succeeded admirably for several years, but the Civil War interfered with the progress of night schools. After the Exhibition of 1876 the managers went to work with renewed energy. At that time (1878) the only similar schools in Philadelphia were those of the Franklin Institute, the Academy of Fine Arts, and the School of Design for Women (the latter was open only to women in the day time.) The Franklin Institute was the only other Institution that had night classes. The Academy of Fine Arts was a practice school for those who had already learned to draw. After 1878 they had a struggling existence until recently, when they received a bequest of $220,000. At the present time they have a well equipped building for teaching three departments, viz : Fine arts, mechanical handiwork, and electrical classes. This school has been a pioneer in Fine Arts in Philadelphia ; they also claim to have organized the first manual training school, also the first school for plumbers, and assisted in the formation of other institutions, including the Drexel Institute.

Fine Art Department—The Fine Art Department affords instruction in drawing and painting in all its branches for pupils to become draughtsmen, architects, designers, artists or teachers of drawing.

Day Classes.—The course is for three years. Grade certificates are issued at the end of each year. The full certificate for art teachers cannot be granted without three years' study. The following subjects are taught in the day classes :—

Mechanical drawing, freehand drawing from object, cast and life, designing, china painting, oil and water color painting.

Fee for term from September to June, five days per week, $20 00.

Night Classes.—Mechanical drawing, freehand drawing, designing, architectural drawing, life classes, geometry and perspective. Boys are trained at night for lithographic work, pen-and ink sketching, painting, etc., and the fees are merely nominal, $5.00 per term of six months. Geometry and perspective are taught free. They have accommodation for 600 pupils.

The school is well equipped with casts, examples for drawing, library, etc.

Drexel Institute.—Drexel Institute was founded in 1891 by Anthony J. Drexel for the improvement of industrial education for young men and young women.

The founder's gifts to the institution amount to three millions of dollars. One million was expended upon the buildings and equipments, and two millions reserved as an endowment fund. It it a magnificent building ; the exterior is grand, and the interior, with its great court 65 feet square, the entire height of the building, with its double marble stairway, gilt candelabras, supported by marble pedestals, fitted with electric lamps, is very handsome. The auditorium is capable of seating 1,500 persons for the free entertainments, lectures and concerts. The museum contains specimens in every department of industrial art, contributed from time to time by wealthy men. The decorative arts of Europe, China, Japan, Egypt and India are well represented. It is on a smaller scale, but a facsimile of the museum at South Kensington.

The Library and Reading Room is 120 feet long by 60 feet wide, contains about 27,000 volumes, and all the leading European and American periodicals relating to Art, Science and Technology.

The Lecture Hall has seats for 300 students, and is equipped with all modern appliances for scientific experiments.

Departments —There are 18 departments with 72 Professors and Directors. I shall refer only to the Fine Arts and Drawing Courses.

Department of Fine and Applied Art —The department is organized as follows :—

1. *School of Illustration* —Life class, draped and costumed model, water-color class. Five scholarships are offered to those who have attended lessons for two years in this department. Fees, $25 00 per term.

2. *School of Drawing, Painting and Modelling.*—There are four classes in this department, and it is expected that students will accomplish the work of each class in one year. Requirements for admission—First Class : applications must be approved by the Director. Second Class : a drawing from a plaster mask or fragment of a figure. Third Class : one or more drawings made from the cast and other objects. Fourth Class : applicants are required to submit specimens of work from the antique or from life. Fees—First and Second Classes, $12 00 per term. Third and Fourth Classes, $15.00 per term.

3. *Special Courses—Course in Clay Modelling* —This course includes decorative sculpture also artistic training for artisans and designers in silver, bronze, iron, etc, in which modelled ornament is applicable. Fees, $15 00 per term.

Course in Wood Carving.—A practical course in wood carving and its application to the various forms of industrial production, including ornaments, panels, enrichments for furniture, architectural decoration, etc. For admission to this course applicants have to be proficient in freehand drawing and elementary clay modelling. Fees, $15 00 per term.

Course in Design and Decoration —This course is intended for the training of professional designers, and occupies three years. It provides instruction in the principles of historic ornament and decorative design, and on the technical methods of their application to wall-paper, textiles, woodwork, metal, furniture, etc. Fees, $15.00 per term.

Graduate Courses —In these courses practical instruction is given in the studios and workshops, and designs are carried out by the students Fee, $20.00 per term.

School of Industrial Art of the Pennsylvania Museum.—The Pennsylvania Museum and School of Industrial Art was incorporated in 1876, with a special view of the development of the Art Industries of the State, to provide instruction in drawing, painting, modelling, designing, etc, through practical schools, special libraries, lectures and museums. The sum of $25,000.00 was subscribed to make purchases at the Centennial Exhibition, and the major part of the collection of the products and manufactures of British India, shown at the Exhibition, was presented to the Museum by the British Government at the close of the Exhibition.

The Museum has grown by purchase, gifts, and bequests, so that it now possesses upwards of 10,000 objects. The Museum is visited by about 400,000 persons a year.

They have a magnificent building at the corner of Broad and Pine Streets, erected in 1893, which they claim is the most spacious establishment in America devoted to the uses of a School of Art.

The school of applied arts is divided into the following departments : drawing, applied design, decorative painting, decorative sculpture, normal instruction, woodwork and carving, illustration, architectural design and textile design, and manufactures

Evening classes are given in freehand drawing, decorative painting, modelling, carving, and applied design.

On Saturdays classes are in session in all branches of Art as pursued in the regular day classes of the institution.

Entrance Examinations.—Pupils are admitted to any of the regular courses in the Art School on passing an examination in drawing from the cast and English composition.

Free scholarships are provided by the State in addition to five City scholarships.

The subjects of study are of a practical character ; for example, in the industrial drawing course, freehand work is divided into 11 subjects, and industrial work has four subjects ; decorative painting and applied design has exercises in seven classes ; decorative sculpture includes original designs, wood carving, etc. ; water color painting, 6 classes ; course in illustrating, 12 classes ; classes for architectural draughtsmen, 12 subjects ; classes for young men intending to become builders, head carpenters, mechanics, etc., 6 subjects ; course on interior decoration, 11 subjects ; teachers' course, 7 subjects ; normal art course, 6 subjects.

Junior Department.—Children's classes for instruction in drawing, painting and modelling, are held three times a week.

Fees.—Day classes, $60 00 per annum, or $10 00 per month; evening classes, $12.00 a year, or $2 50 per month; Saturday classes, $10 00 a year, or $2.00 per month; life classes, $3.00 per month.

Money Prizes offered in addition to Scholarships—Architectural design, $25.00; pen and ink drawing, $25.00; work determined by the Jury of Awards, $25 00; industrial drawing, $25.00; original design, three prizes of $10 00 each; best work in drawing, $20 00; best work in modelling, $20.00

Buffalo Art School—The Art Students of Buffalo was incorporated in 1894, to establish a school for teaching the various branches of Fine Arts.

1. *Sources of Support*—The school is not endowed. It is maintained from students' fees, members' subscriptions, and an annual allowance from the Fine Arts Academy.

2. *Subjects Taught*—(*a*) Elementary Children's Class.—The children's Saturday afternoon class is very popular. Pupils are taught entirely from objects, no copying being allowed; age limit, 14 years; fees, $1.25 per month, $9 00 per annum. (*b*) Children's Class Antique.—Saturday morning, open only for children promoted from the Saturday afternoon classes. Fees, $1 50 per month, $10.00 per annum (*c*) Public School Teachers' Class.—Saturday morning's to give teachers assistance in their work in the public schools. Fees, $2.00 per month, $14.00 per annum (*d*) Life Classes.—Drawing and painting from the nude. Women's classes daily, men's classes four days a week. Morning classes $7.00 per month, $50.00 per annum; afternoon classes, $5.00 per month, $35.00 per annum. (*e*) Painting from the Draped Model.—Drawing and painting from the costumed model daily. Fees, $7.00 per month, $50.00 per annum. (*f*) Painting from Still Life.—Oil and water colors daily. Fees $5.00 per month, $35.00 per annum. (*g*) Antique Drawing from the Cast.—Elementary and advanced, daily Fees, mornings, $5 00 per month, $35.00 per annum; afternoons, $5.00 per month, $35 00 per annum; evenings, $2.50 per month, $17.00 per annum. (*h*) Design—Daily, afternoon or evening. $5 00 per month, $35 00 per annum (*i*) Clay modelling.—From cast, ornament, and plant form and life, daily. $5.00 per month, $35 00 per annum. (*j*) Mechanical Drawing.—Afternoon or evening. $5.00 per month, $35.00 per annum.

In addition they have a composition class in connection with life and design classes, and a sketch class from draped model, free to students in other classes

3. *Privileges of Students*—(*a*) Scholarships.—Four scholarships are given annually by the League to the public schools and one to the Women's Union.

The Art Students' League, of New York, and Pratt Institute, Brooklyn, award a scholarship yearly, and the Buffalo Society of Artists confers a scholarship yearly.

Scholarships of four months' free tuition are also given to the best students in the antique, design and women's life classes.

(*b*) Prizes.—Mr. Philip Sherwood Smith has offered prizes, varying from $15.00 to $50.00 for the best work done in the life and costume classes, also landscape and machinery drawing, designing, modelling, wood carving, etc., aggregating $600 00.

(*c*) Other Privileges.—The students are allowed to work in the Gallery of the Fine Arts Academy, and have the use of the Art Library of the Buffalo Society of Artists and free admissions to their exhibitions.

4. *Number of Students*—The roll shows 227 students (including two from Canada) for the term ending 1st June, 1901.

Remarks.—Drawing is taught in all Public Schools in New York, Philadelphia and Buffalo. In some of the Boroughs, Schedules of Exercises for each week are prepared, embracing seven years studies.

In the first three years three hours per week are arranged for color, design, construction work, drawing and modelling. Brush work in water color is not required until the third year, though offered as an option in the lower grades.

For the classes of the last four years, the schedule is arranged to give two periods of 60 minutes each per week to drawing, design, etc., which includes object drawing, design, historic ornament, mechanical drawing, inventional geometry and picture study.

After seven years study in drawing in the public schools, those who wish to become teachers have to study drawing two years in high schools, and two years in normal or training schools

All teachers must pass an examination in drawing.

Directors of Drawing are appointed by the Board of Education, but no person is eligible for election as a director of drawing who is not (1) a graduate of a college or university, (2) a graduate from a course of professional training in drawing of at least two years, and three years successful experience as a teacher of drawing. The Directors of special branches, drawing, etc., act as advisors to the Board of Superintendents.

Special teachers of drawing may be appointed by the board of superintendents on the recommendation of directors of drawing.

The system adopted for drawing in public schools is excellent; the pupils are first taught drawing from the blackboard, no drawing books are used, their work is done on Manilla paper for all grades of drawing, white paper for brush work in colors, and gray paper for work in charcoal or colored chalk.

The work done in the Art Schools is all of a practical character. Freehand drawing and shading from the flat is not taught from copies, same as in our Art Schools, and I strongly recommend that the Minister have these subjects revised in the programme prescribed for the Art Schools, etc. of Ontario.

APPENDIX O.—*MACDONALD MANUAL TRAINING SCHOOLS.*

Report of the Director.

Hon. Richard Harcourt, M. A., K. C., M.P.P., Minister of Education.

Sir,—I have the honour to submit to you my first annual report on the work that has been carried on in the Macdonald Manual Training Schools, in the Province of Ontario, during the past year.

Centres have been opened in three cities of the Province.— Brockville, Ottawa, and Toronto, in the order named and the growth and development in each has been gratifying and encouraging. The first Centre opened in the Dominion of Canada under the fund was that at Brockville, on Tuesday April 3rd 1901. On January 19th 1901 this School was formally opened by Their Excellencies The Governor General and The Countess of Minto, and Hon. Richard Harcourt Minister of Education for Ontario.

Centres for Manual Training have been opened in Ottawa as follows:—

Nov. 5th.	Elgin Street.
	Archibald Street.
Jan. 7th	George Street.
Jan. 23rd.	Model School.
	Cambridge Street.
	Creighton Street. (in preparation)

The Ottawa Schools were opened by The Governor General and the Countess of Minto on Saturday October 27th.

Centres have been opened in Toronto up to the present date as under:—

March 25th.	Ryerson School
April 15th.	Wellesley School.
Sept. 9th.	Dufferin School.
Sept. 16th.	Given St. School.

Accommodation is now provided in the Province for boys in Public Schools as follows:—

Brockville. 30 boys per session, giving a total of 300 per week.
Ottawa, 160 boys per session, giving a total of 1,600 per week.
Toronto, 100 boys per session, giving a total of 1000 per week.
In this way 290 boys may be accommodated every school session, and 2900 every school week.

Up to July 31st the schools have been opened 1467 times and 32965 attendances have been made.

The manner in which the boys have taken to the subject, and the support the movement has received from the teachers the parents, and the press shows that it has filled a gap in the Educational system of the Province, and only needs official recognition and encouragement by a Departmental grant to become general throughout the Province.

Classes for the training of teachers have been opened in the three Cities as specified below:—

July 17th, 1900 — A holiday course at Brockville attended by eight teachers. This course continued until August 16th.

Nov. 20 h, 1900.— A class in Cardboard Modelling opened for the Brockville teachers. The subject was taken by eight teachers and the class opened since the Summer Vacation of 1901 is attended by twenty-four students.

Jan. 19th, 1901.— Manual Training Classes in woodwork opened in Ottawa, attended by ninety teachers These c asses are useful as they give the teachers an idea of the underlying principles and show them how Manual Training may be co-related with other school studies and have proved very helpful to the work.

Feb 20th, 1901.— Classes for Ottawa Normal Students. Eight hours training per week were given. As the term is short and the work great the students had to devote their private time to the subject. It would aid the work greatly throughout the Province if Manual Training could be made an obligatory subject in all the Normal Schols of the Province as is done in Nova Scotia. Four of these students are now employed under the fund.

April 25th, 1901.—A class in Cardboard Modelling commenced for teachers in Public Schools. This class was attended by eighty students, and as the numbers have increased another class has been opened. The scheme consists of fifty models, and was drawn up in response to requests from teachers and parents that something should be done for the younger girls and boys. The Ottawa School Board has adopted the scheme, and it is hoped that early in the New Year it will be in operation in all the schools, and taught by the grade teachers.

July 2nd, 1901.—A holiday course was held in Ottawa during the month of July. Eighty teachers took the course, and displayed much interest in the work.

September 19th, 1901.—Classes for teachers commenced in Toronto. One hundred teachers are now in attendance and accommodation is being provided for forty others

As there promises to be a demand for properly qualified teachers, a training course lasting for a period of six months, will be held in Ottawa commencing January next. The syllabus of this course has already been sent to you.

Qualified teachers are now employed by the fund as follows :—Brockville, 9; Ottawa 9 ; Toronto, 4.

In accordance with the suggestion made by you, I beg to call your attention to the following pages and sections, relating to Manual Training, in the Nova Scotia Manual of School Law, 1901 .—

Page 20, s. 71; Page 49, amended Act ; Page 79, s. 53, c. and d ; Page 84, ss. 73 to 81 ; Page 137, s. 185 ; Page 141, s. 207 ; Page 147, ss. 7, 8.

Dr. Glashan, the Public School Inspector of the City of Ottawa, has made the following report :—

"Instruction in Manual Training has now been given for more than a year in all the Public Schools of the City of Ottawa, and time has thus been allowed for dispelling the glamour that to many minds invests every new subject of education claiming to be "practical" with a charm of undefined and unlimited possibilities and merits, while it has afforded opportunity for overcoming the unfavourable prejudices of others against the unknown and the untried, and has enabled all to form an unbiased judgment from experience. That this judgment is favourable to Manual Training need hardly be said. Parents, teachers and pupils are all in favor of the subject—parents, because they find that it has given to their children a new interest in study, and has added zest to their school life ; teachers, because they find that Manual Training is not a mere training in dexterity and development of manual skill, but a training in forming clear and distinct concepts and images of the subjects of their thoughts, and thus prepares the pupils for the better understanding of what they hear and what they read, and consequently for the

better comprehension of their lessons in arithmetic, grammar, geography, and history; pupils, because it is a change from continual study through verbal description, and because it brings them the welcome relief of the direct and immediate study of objects. That the teachers on the Ottawa Public School staff highly appreciate the educational value of Manual Training is proved by the fact that they have themselves taken a course of instruction in that subject. They recognize that such a course is necessary to the full rounding out of their professional training, for it is at once the complement of the other school studies, and the continuation and rational development of the work of the Kindergarten. Science, which is simply organized knowledge, begins with qualitative observations and experiments, and becomes exact in proportion as it advances to quantitative determinations, in proportion as it admits of and submits to measurement. In the Kindergarten we have the qualitative stage; in the Manual Training classes we have the distinct recognition that knowledge of the world of real things and of their relations to be exact must be definite, determinate, measured. The present age has been called the age of Science; if our systems of education are to be suited to the age, and to its ideals and demands, they must recognize and give due prominence to training in science and its methods. What Kindergarten work is to our primary classes, what the laboratory work is to our High Schools and Colleges, that Manual Training is in our Public Schools, and its importance is measured by the fact that it reaches all pupils, while the Kindergarten, the High School, and the University reach only a few."

Mr. J. L. Hughes, Public School Inspector for the City of Toronto, reports as follows:—

"I have pleasure in stating that the work of Manual Training in Toronto Public Schools opened through the kindness of Professor James W. Robertson—representing Sir William Macdonald—is giving entire satisfaction.

"We have Manual Training rooms in connection with four of our schools—Wellesley School, Ryerson School, Dufferin School, and Givens Street School. Ten classes each week are conducted in each, except in Wellesley School, in which there are nine classes. Altogether 780 boys receive instruction in Manual Training each week. The boys have shown a deep interest in the work, and are making satisfactory progress. I am glad to be able to report that the teachers in our schools are enthusiastic in their attitude towards the work of Manual Training. In response to the kind offer of Professor Robertson to provide instruction for eighty teachers, I received applications from one hundred and thirty teachers.

"The teachers' classes promise to be of great service in revealing to the teachers both the practical and educational value of Manual Training."

Knowing the great interest you take in the extension of practical instruction, it may not be thought presumption on my part to offer suggestions that would perhaps make for its extension throughout the Province:

1. That a grant from the Department should be awarded to every school taking an approved course of Manual Training. This grant should be so much per attendance per child.

2. That a properly qualified Inspector should be appointed by the Department. His duties might be,—

(*a*) to draw up a series of regulations for your approval, to which all schools would be required to conform in order to secure official recognition;

(*b*) to examine and approve (or otherwise) all schemes of Manual Training, proposed for adoption in any Public or High School in the Province;

(*c*) to inspect all schools and report as to:
1. observance of regulations,
2. quality of the teaching, and
3. sufficiency of equipment; and

(*d*) to confer with and advise School Boards contemplating the introduction of Manual Training into its Schools.

I have the honour to be, Sir,

Your obedient servant,

ALBERT H. LEAKE,

Director of Macdonald Manual Training Schools for Ontario.

Ottawa, 2nd December, 1901.

APPENDIX P.—*SCHOOL OF PRACTICAL SCIENCE; UNIVERSITY OF TORONTO; UNIVERSITY COLLEGE.*

1. Annual Report of the School of Practical Science.

To the Hon. R. Harcourt, M.A., M.P.P., Minister of Education.

Sir,—I have the honour to submit the annual report of the School of Practical Science for the year 1901.

The calendar year not being conterminous with the academic year, this report will cover the second term of the academic year, 1900-1901, and the first term of the academic year, 1901-1902, except when otherwise stated.

The number of students in attendance at the school was as follows:

School of Science Students.

Taking full courses.	2nd Term, Session 1900-01.	1st Term, Session 1901-02.
I Year	109	147
II Year	58	81
III Year	33	45
IV Year	21	15
Taking partial courses	3	2
	224	290

University Students.

	2nd Term, Session 1900-01.	1st Term, Session 1901-02.
Arts	23	27

The students of the School of Practical Science taking full courses are required to take University lectures in Mathematics and Physics.

The attendance at these lectures was as follows:

	2nd Term, Session 1900-01.	1st Term, Session 1901-02.
Mathematics	166	227
Physics	187	178

The fees paid by the students of the School of Practical Science for the academic year 1900-01 were $15,381.00.

Of the above amount $2,066 were paid to the Bursar of the University of Toronto under the authority of an Order-in-Council dated June 20th, 1901, $958.50 to the Examiners of the School for the session 1900-01 under the authority of an Order-in-Council dated Feb. 3rd, 1899, and the remainder $12,356.50 to the Hon. the Provincial Treasurer.

The number of regular students who presented themselves for examination at the annual examinations of the academic year 1900-01 was one hundred and eighty-seven. Of these one hundred and fifty-one passed.

Two candidates for special certificates passed the final examinations.

The number of graduates was thirty-three. The total number of graduates is three hundred and three.

The following statement shows the geographical distribution of the graduates now living:

	Number.	Percentages.
Canada	220	75
United States	65	22
Other Countries	9	3
	294	100

The number of graduates who proceeded to the degree of B A. Sc. at the University examinations of 1901 was twenty. The total number of graduates who have received the degree of B. A. Sc. is ninety-three.

Two graduates proceeded to the degree of C. E in the University of Toronto. The total number of graduates who have received this degree is eighteen.

One graduate proceeded to the degree of M.E. (Mechanical Engineer) in the University of Toronto. The number of graduates who have received this degree is two.

Two graduates have received the degree of M.E. (Mining Engineer), and one has received the degree of E. E. in the University of Toronto.

The regular courses in the school are :

1. Civil Engineering (including Sanitary Engineering.)
2. Mining Engineering
3. Mechanical and Electrical Engineering.
4. Architecture.
5. Analytical and Applied Chemistry.

The following statement shows the courses of lectures and practical instruction, the instructors, and the number of students taking the various courses :

SUBJECTS TAUGHT BY THE FACULTY OF THE SCHOOL OF SCIENCE.

Subjects.	Instructors.	Number of Students.	
		2nd Term. Session 1900-1901.	1st Term. Session 1901-1902.
Organic and inorganic chemistry Applied chemistry Assaying	W. H. Ellis, M. A , M. B. Professor J. W. Bain, B. A. Sc., Demonstrator E. G. R. Ardagh, B. A. Sc., Fellow J. A. DeCew, Grad. S. P. S., Lecture Asst.	209	276
Mineralogy Petrography Metallurgy Mining and ore dressing German	A. P. Coleman, M. A., Ph. D., Professor G. R. Mickle, B. A., Lecturer A. H. A. Robinson, B. A. Sc., Fellow	170	215
Statics Dynamics Strength of materials Theory of construction Machine design Compound stress Hydraulics Thermodynamics and theory of the steam engine French	J. Galbraith, M A., Professor J. A. Duff, B. A., Lecturer R. W. Angus, B. A. Sc., Lecturer W. Monds, B. A. Sc , Demonstrator	220	284
Drawing Architecture Plumbing, heating and ventilation Mortars and cements Brick and stone masonry	C. H. C. Wright, B. A. Sc., Professor J. T. M. Burnside, B. A. Sc , Fellow A. H. Harkness, B. A. Sc., Fellow J. A. Craig, B. A. Sc., Fellow	203	274
Surveying Geodesy and astronomy Spherical trigonometry Least Squares Descriptive geometry	L. B. Stewart, D. T. S., Professor A. T. Laing, B. A. Sc., Demonstrator	200	273
Electricity Magnetism Dynamo-electrical machinery Mechanics of machinery Rigid dynamics	T. R. Rosebrugh, M. A., Professor W. G. Chace, Grad, S. P. S., Fellow.	136	185

SUBJECTS TAUGHT BY THE FACULTY OF THE UNIVERSITY OF TORONTO.

Subjects.	Instructors.	Number of Students.	
		2nd Term. Session 1900-1901.	1st Term. Session 1901-1902.
Algebra, Euclid, Plane trigonometry, Analytical geometry, Calculus, Astronomy	Alfred Baker, M. A., Professor; A. T. DeLury, B. A., Lecturer; E. F. Burton, B. A. Fellow	166	227
Sound, Light, heat, electricity and magnetism, Hydrostatics, Biology	James Loudon, M. A., L.L.D., Professor; W. J. Loudon, B. A., Demonstrator; C. A. Chant, B. A., Lecturer; J. C. McLennan, B.A., Ph.D., Demonstrat.; G. R. Anderson, M. A., Lecture Assistant; R. Ramsay Wright, M. A., B. Sc., Prof.	187	178

GENERAL REMARKS.

Drawing

In addition to the rooms originally devoted to drawing, which are fully occupied, it has been necessary to remove the seats from the assembly hall and convert it into a drafting room, for the use of the first year. Next year if the first year class should be of the same size as the present one 1,400 sq. ft. additional will be required. It is difficult to see how this accommodation can be provided until the removal of the Chemical laboratories and the Geological collections to the proposed new building has taken place.

Analytical and Applied Chemistry.

The crowded condition of the laboratories, which was referred to in the report of last year, is intensified by the larger number at present in attendance. The troubles due to over crowding and insufficient ventilation become more and more acutely felt each year. The promise of rapid development of the chemical industries of the country, such as acid, alkali and bleach manufacture, soap making, sugar refining, pulp making and gas manufacture, as well as the constantly increasing application of chemistry to the examination of all kinds of industrial products, including those of iron and steel and other metallurgical processes, demand a commodious and well equipped laboratory for teaching qualitative and quantitative analysis Modern metallurgical assaying covers the whole range of analytical chemistry and demands a training in all branches of this science including gas analysis and electrolysis. The growing importance of electro-chemistry makes it imperative to include instruction in this subject in the education of an analytical chemist, works manager or metallurgist and accommodation and equipment for these purposes are among the pressing needs of the department.

Mineralogy and Mining.

As all the space available for Mineralogy and Mining in the present building is already utilized, no important improvement can be made; the only addition to the equipment since the last report is an ore sampler. Since new quarters are to be provided it has not been considered advisable to recommend any alterations in the part of the building at present occupied by this department.

Electrical Laboratory.

The dynamos and measuring instruments mentioned in last year's report have been purchased and an induction motor has been ordered to be built and delivered during the present session. On account of the great increase in the number of students, additional laboratory space is required and also the services of an additional instructor.

Steam Engine and Hydraulic Laboratories.

The equipment in steam engineering has been increased by the addition of new types of injectors for experimental purposes, a complete set of thermometars and some pressure gauges. A new damper regulator is needed. A number of kinematic models should also be procured for the purpose of illustrating lectures on mechanism. A Pelton wheel has recently been added to the equipment of the hydraulic laboratory. Additional apparatus for the purpose of investigating hydraulic resistance in small pipes is required.

Tests of Metals.

A room fitted up with vise benches, forges and a small crucible furnace for the purpose of training students in making easy and short tests of metals and alloys ought to be provided as soon as possible.

Surveying, Practical Astronomy, Etc.

The chief requirement in this department is additional equipment for instruction in the higher branches of astronomy and geodesy, to meet a tendency shown by students to turn their attention to that class of work. A zenith telescope and an astronomical transit instrument should be provided, and also some additional apparatus in connection with the 100 foot comparator. For the reception of the above instruments, and also to serve as an observatory, a small building should be erected, the cost of which would be comparatively trifling.

New Building.

The plans are now being prepared for the new building described in the annual reports for 1899 and 1900 as a necessity of the immediate future. This building will provide for the work in Analytical and Applied Chemistry, Mineralogy, Geology and Mining now carried on in the older part of the present building. Since the classes in the School are becoming larger year by year and the present lecture rooms will barely accommodate many of them, provision is being made in the old building for this purpose. Accommodation is also being provided for the work in Geology and Mineralogy of the Faculty of Arts. A museum devoted to Geology, Mineralogy, Mining and Applied Chemistry will be provided for in one of the wings. The milling laboratory will be housed in a separate building in the rear of the main one.

The rooms to be vacated in the present building will require many alterations and repairs in order to adapt them to the work in the subjects which will continue to be taught in this building.

J. Galbraith,
Principal.

Toronto, December, 1901.

2. Annual Report of the University of Toronto.

To His Honour, the Honourable Sir Oliver Mowat, K.C.M.G., Lieutenant-Governor of the Province of Ontario, Visitor of the University of Toronto:

May it please your Honour,—According to "The University Act" of 1901, it is incumbent on the President of the University "to report annually to the Lieutenant-Governor upon the progress and efficiency of the University, making such suggestions and recommendations as he may deem expedient."

This Act, the provisions of which introduced extensive changes into the constitution and administration of the University, came into force on the 15th of April, 1901. The present report should therefore, strictly speaking, refer to the period between the 15th of April and the 30th of June, the date of the expiration of the academic year, a time manifestly too short upon which to base an annual report of the scope contemplated by the Act. In order, however, to preserve the continuity of former reports in so far as the statistics are concerned, I deem it expedient to submit for the information of Your Honour the following statistical statement relating to the year extending from the 1st of July, 1900, to the 30th of June, 1901.

The following table exhibits the numbers attending the pass lectures in University subjects :

Pass.

Subjects.	Mathematics.	Physics.	Chemistry.	Biology.	Mineralogy and Geology.	Philosophy.	Logics.	Political Science.	History.
Arts—First year	119	16	.....	112	.....	.....	.....	.....	.....
" Second year	.....	.....	6	.....	47	125	105	.....	86
" Third year	.....	10	.....	.....	.....	.....	.....	37	36
" Fourth year	25	.....	.....	.....	.....	17	.....	25	22
Medicine—First year	.....	112	115	121	.....	.....	.....	.....	.....
" Second year	.....	.....	98	96	.....	.....	.....	.....	.....
School of Practical Science	173	149	.....	.....	.....	.....	.....	.....	.....
Totals	317	287	219	329	47	142	105	62	144

The following table exhibits the numbers attending the Honour lectures in University subjects :

Honour.

Subjects.	Mathematics.	Physics.	Chemistry.	Biology.	Physiology.	Mineralogy and Geology.	Philosophy.	Political Science.	History.	Italian.	Spanish.	Phonetics.
Arts—First year	29	66	64	21	.....	.....	.....	.....	.....	35	15	44
" Second year	56	56	39	12	12	20	22	34	49	23	4	.....
" Third year	14	23	10	3	.....	8	13	37	48	15	5	.....
" Fourth year	9	5	6	7	7	4	15	15	38	10	3	.....
" Graduates	3	.....	2	.....	.....	.....	6	.....	.....	.....	.....	.....
" Ph. D. students	.....	1	1	4	2	1	4	1	.....	.....	.....	.....
Medicine—First year	.....	.....	.....	.....	123	.....	.....	.....	.....	.....	.....	.....
" Second year	.....	.....	.....	.....	102	.....	.....	.....	.....	.....	.....	.....
Totals	111	151	122	47	246	33	60	87	135	83	27	44

The following table exhibits the numbers taking the practical work in the *laboratories* :

Laboratories.	Physical.	Chemical.	Biological.	Physiological.	Mineralogical.	Psychological.
Arts—First year	31	22	21	.....	.....	.....
" Second year	22	39	12	12	20	.....
" Third year	19	10	3	.....	8	13
" Fourth year	5	6	7	7	4	23
" Graduates	.....	2	.....	.....	.....	.....
" Ph. D. students	1	1	4	2	1	.....
Medicine—First year	.....	115	121	.....	.....	.....
" Second year	.....	98	96	102	.....	.....
School of Science—First year	54	.....	.....	.....	.....	.....
" " Second year	25	.....	.....	.....	.....	.....
" " Third year	28	.....	.....	.....	.....	.....
Totals	185	293	264	123	33	36

The following table exhibits the numbers of those admitted to Matriculation standing and degrees in the various faculties from June, 1900, to June, 1901 :

Law—

Matriculation	8
Degree of LL.B.	6
Degree of LL.D.	..

Medicine—

Matriculation	90
Ad eundem statum, from the College of Physicians and Surgeons	14
Ad eundem statum, from other Universities	10
Degree of M.B.	50
Degree of M.D.	4

Arts—

Matriculation	251
Ad eundem statum, from other Universities	11
Degree of B.A.	113
Degree of M.A.	19
Degree of Ph.D.	2

Agriculture—

Degree of B.S.A.	1

Pedagogy—

Degree of D. Paed.	..
Degree of B. Paed.	2

Dentistry—

Matriculation	24
Ad eundem statum, from the R. C. D. S.	24
Degree of D.D.S.	27

Music—

Matriculation	2
Degree of Mus. Bac.	..

Pharmacy—

Matriculation	1
Ad eundem statum, from the Ont. Coll. Pharmacy	56
Degree of Phm. B.	57

Applied Science—

Matriculation	3
Degree of B.A.Sc.	20

Engineering—

Matriculation	3
Civil Engineering	2
Mechanical Engineering	1
Mining Engineering	..

During the year fourteen hundred and thirty-six candidates were examined in the different faculties and departments, as follows :—

Faculty of Law	15
Faculty of Medicine	369
Faculty of Arts	886
Department of Agriculture	1
Department of Pedagogy	2
Department of Dentistry	79
Department of Music	4
Department of Pharmacy	57
Department of Applied Science	20
Department of Engineering	3
Total	1,436

J. LOUDON,
President.

TORONTO, December 27th, 1901.

3. REPORT OF UNIVERSITY COLLEGE.

To the Honourable Sir Oliver Mowat, K.C.M.G., Lieutenant-Governor of Ontario, Visitor of University College :—

MAY IT PLEASE YOUR HONOUR,—The Council of University College beg to submit the following report upon the academic session, 1900-1901 :

The number of matriculated students in Arts is slightly less (eight less) than last year, to be attributed to the very marked movement of the student body towards the faculty of applied science.

On the other hand the total number in attendance at Arts lectures is increased by forty, due to the great increase in the number of occasional students taking the lectures of Professor Alexander, such students now number over one hundred in the four years.

In other respects the chief feature noticeable in a comparison of the figures is the falling off in the number of general course candidates in all subjects (except English) and an increase to about the same extent in the number of honour students in almost all departments. Possibly this should be regarded as an indication that the slight falling off in quantity noted above is not accompanied by any deterioration in quality but rather by the reverse.

The number of women attending University College continues to overtax the resources of the officers engaged in finding suitable accommodation for them in the boarding houses of the city. There is no doubt also that the accommodation itself is shrinking. With the growth of the city and at the same time the spread of boarding house life, the student, who is absent for nearly half the year, becomes less and less desirable as a boarder, and the houses willing to receive students become increasingly difficulty to find.

Even were this not so, few of these houses are able to offer the care and attention, which the health of the women students requires, and the number of breakdowns, especially in May, attributable in great measure to the want of a good Residence increases.

The College Council beg to call the immediate attention of your Honour and your Ministers to this matter, and to remind you that the Province has hitherto done nothing for women as such in connection with University education.

The Council is of opinion that the building of a Women's Residence is at the present moment the first need of University College.

Details with regard to the staff and numbers of students will be found below.

	First year	Second year.	Third year.	Fourth year.	Totals.
Matriculated students	115	117	103	90	425
Matriculated students with dispensation	2	3	5	1	11
Non-Matriculated students	37	16	1	.....	54
Occasional students	34	17	14	38	103
Graduate students	2	5	.....	8	15
Ph.D. students	.....	.....	.....	.....	.....
Totals	190	158	123	137	608

Session 1900-1901.

Pass.	Greek.	Latin.	English.	German.	French.	Orientals.	Ethics.	Ancient History.
First year	23	118	100	37	51	38	.....	70
Second year	28	67	65	32	44	9	.....	.....
Third year	5	14	41	7	13	1	44	.....
Fourth year	5	16	33	9	14	4	.....	.....
Totals	61	215	239	85	122	52	44	70

Honour.	Greek.	Latin.	English.	German.	French.	Orientals.	Ethics.	Ancient History.
First year	24	27	77	47	59	.....	.....	27
Second year	25	24	40	20	27	2	.....	58
Third year	8	8	33	25	24	3	13	8
Fourth year	8	6	50	20	21	3	15	6
Totals	65	65	200	112	131	8	28	99

All of which is respectfully submitted.

MAURICE HUTTON,
Principal.

University College,
January, 1902.

APPENDIX Q.—*SUPERANNUATED TEACHERS.*

(Continued from Report of 1900.)

1. † Allowances granted during 1901.

Register No.	Name.	Age.	Post Office.	Years of service.	Allowance.
					$ c.
1070	McCall, Wm. Cowan	60	Forestville	31	186 00
1071	Henderson, Anson Gains	48	Whitby	20½	143 50
1072	Cook, Samuel G	60	Gananoque	36½	250 50
1073	Bradley, Wm. Edward	60	Freeman	23	161 00
1074	Knowles, Richard Hewel	58	Hespeler	29½	207 00
1075	McMain, Chas. Simpson	59	62 Elliott St., Toronto	37	257 00
1076	Lusk, Charles Horace	65	Oakville	39½	276 50
1077	Sharman, Geo.	60	Yorkton, N. W. T	34	236 00
1078	McDonald, Donald	60	Orangeville	26	91 00
1079	McKeown, Wm	61	Belleville	39½	260 50
1080	Eckardt, Tobias	60	Thamesford	30	198 50
1081	Amos, Wm. Thomas	48	Lieury	29	203 00
1082	Leith, William	61	Haliburton	28	168 00
1083	Blackman, Theodore	57	Dunnville	35	236 00
1084	Powell. Francis Cox	61	Kincardine	38½	268 50
1085	Godwin, William Henry	57	Kingston, 101 Pine St	38½	257 50
1086	*Wells, Eliz. C	62	Simcoe	38	266 00
1087	*Hobbs, Wm. B	60	Minden City, Mich., U.S.	7	49 00
1088	*Martin, Samuel	49	Bradford	28½	192 50
1089	*Sanderson, Robert	60	Grand Valley	31	217 00
1090	*Wright, Arthur Walker	46	Guelph	23	159 50
1091	*Brebner, Jno	71	Sarnia	49	343 00

2. Summary for Years 1882-1901.

Year.	Number of teachers on list.	Expenditure for the year.	Gross contributions to the fund.	Amount refunded to teachers.
		$ c.	$ c.	$ c.
1882	422	51,000 00	13,501 08	3,660 10
1887	454	58,295 33	1,489 00	3,815 80
1892	456	63,750 00	1,313 50	786 86
1897	424	62,800 33	847 00	620 27
1900	418	63,871 43	1,271 75	879 52
1901	414	64,250 66	1,565 00	572 00

Four teachers withdrew their subscriptions from the fund during 1901.

† As the sum of $4 is deducted from each Superannuated Teacher's allowance, as subscription to the fund, the payments were $4 less in each case than given above.

* Allowance commences with 1902.

APPENDIX R.—*CERTIFICATES, ETC.*

1 Inspectors' Certificates Issued in 1901.

Dowsley, William Clinton, B A.
Hinde, Edward William, B.A.
Luton, James T. M.A.
McCaig, James, B.A.
McDougall, Neil, B.A.
McKim William Andrew, B A.
Meiklejohn, Allan James, B A.
Morgan, Joseph, B A.
Mowat, Alexander, B A.
Sexton, James Henry.
Standing, Thomas William, B.A.
Thompson, Peter M., B.A.
Whyte, David, B.A.—Total—13.

2. Certificates—High School Principals and Specialists, 1901.

Annis, Mary, B.A., (French and German).
Ashwell, Annie E, B.A., (Eng. and Hist., Fr. and Ger.)
Auld, Charles, B.A., (Mathematics).
Bruels, Ira, D, B.A., (Science).
Bryan, Hugh Wallace, M.A., (Classics).
Colling, George Featherston, B.A., (Mathematics)
Clothier, James O, B.A.
Day, Alfred Ernest, M.A, (Eng. and Hist., Fr. and Ger.)
Denyes, James Malcolm, B.A.
Dowsley, William Clinton, M.A., (Classics, Eng. and Hist.)
Duff, James, M.A, (Eng. and Hist,)
Eldon, Robert Henry, B A., (Commercial).
Farquharson, Robert Andrew, B.A., (Eng. and Hist, Fr. and Ger.)
Griffin, Albert Dyke, B A., (Mathematics).
Hinch, Nicholas Edward. B.A., (Eng. and Hist, Fr, and Ger.)
Johnston, Frederick James, B.A., (Science).
Jolliffe, Richard Orlando, B.A., (Classics).
Keillor, James, B.A.
Keith, George Walter, B.A., (Mathematics).
Kennedy, George E., B.A., (Science).
Liebner, Ernest Oscar, B.A., (Science.
Liddy, William Robert, B.A., (Science).
Luton, James T, B.A., (Classics).
Macmillan, Herbert Seymour, B.A., (Fr. and Ger).
McCready, Samuel Broadfoot, B.A., (Science).
McKim, William Andrew, B.A., (Eng and Hist., Fr. and Ger.)
McNeely, Elizabeth, B A., (Eng. and Hist.)
Marty, Alletta Elise, M.A., (Fr. and Ger.)
Meiklejohn, Allan James, B.A., (Eng. and Hist.)
Nichols, Bessie Hockings, (Eng. and Hist., Fr. and Ger.)
Pearson, Alexander, B.A.
Reid, Marvin Ryckman, M.A., (Science).
Robertson, Alexander Morton, M.A., (Maths., Fr. and Ger.)
Rudlen, George William, B A., (Mathematics).
Standing, Thomas William, B.A., (Mathematics).
Stubbs, Samuel James, B.A., (Eng. and Hist.)
Taylor, Wilson, B.A., (Mathematics)
Thompson, John Fletcher, B.A., (Classics).
Treleaven, John Wesley, B.A., (Classics)
Wightman, Robert, B.A., (Mathematics).
Wilson, Thomas Matheson, B.A., (Science.)
Waines, William Leslie, B.A.
Whyte, David, B.A., (Science)—Total—43.

3. Certificates—High School Assistants and Specialists, 1901.

Balls, George Herbert, B.A.
Beaton, Kate Florence, B.A.
Bridgman, Clara Mary.
Clapp, Florence H.
Davidson, Mrs. Margaret C.
Fleming, Ethel Catharine. B.A. (Moderns and History).
Foster, Jessie.
Graham, Peter Edwin, B.A. (French and German).
Kent, Eleanor (Commercial).
Laing, Arthur Stewart (Commercial).
Langrill, Adelaide Jane, B.A. (Moderns and History)
Lewis, Jessie Morgan (French and German).
Martin, John Stickler, B.A.
Martin, William Melville, B.A. (Classics).
Mathews, Stanley Wade, M.A. (Mathematics).
Moore, James R., M.A. (Science):
Page, Ralph Barlow, B.A. (Moderns and History).
Race, Cecil Ethelbert, B.A. (Mathematics).
Sexton, James Henry (Science).
Simpson, Robert S. (Commercial).
Taylor, Luther H. (Commercial)
Williams, Lorne Joseph.
Wilson, W. Ashbury, B.A. Total—23

4. Summary of Public School Teachers' Certificates, 1901.

	Male.	Female.	Total.
First Class Certificates	57	34	91
Second Class Certificates	123	480	603
Third Class, per County Model School reports	367	778	1,145

5. List of Provincial Certificates Issued by the Education Department, 1901.

I.—First Class

Aberhart, William.
Amoss, Harold E.
Anderson, Frank Cecil.
Anderson, William George.
Bailey, Joseph J.
Ball, A. Winnifrede.
Barnes, Charles Herbert.
Barry, Sarah J.
Bastedo, Ellen Baxter.
Bell, Lavinia Maud.
Bleakney, Charlotte Elizabeth.
Blyth, Janet.
Bowman, Nora F. J.
Bradley, Anna Louise.
Bright, Violetta.
Buchanan, John Alex.
Burns, Annie.
Cameron, Jennie M.
Carpenter, William G.
Clarke, Frank B.
Clarke, Nellie.
Clark, George A.
Coultes, Edgar Simkin.
Cunningham, J. Harry.
Davidson, John H.
Downey, William Henry.
Elliott, Thomas.
Ferguson, Donald J.
Galbraith, John E.
Galbraith, Thomas M.

5. List of Provincial Certificates, etc —*Continued.*

I.—First Class.—Continued.

Gilchrist, Dugald Alex.
Gundy, Lillie Gertrude.
Hanahoe, Agnes Gertrude.
Harkness, Mary Deel.
Hedley, Robert Wesley.
Herbert, John Wesley.
Howell, Mildred O. R. E.
Hunnisett, James Edward.
Hutchinson, Mary R.
Jeckell, Adelaide V.
Keddie, Emily Louise.
Kerfoot, Horace Watson.
Kilgour, James Thomas.
Kingston, George Augustus,
La Chance, Genevieve.
La Chance, Gertrude.
Lafferty, Isabella Sarah E.
Langford, George Nelson.
Lewis, Thomas Neelin.
Lewis, Lafayette Levi.
Mackenzie, Anna.
McEwen, James.
McIntosh, Cameron.
McKay, Donald A.
McKenzie, Cecil, L. T.
McMillan, Tena.
Marsh, Winfred E.
Mason, Gresham William.
Matheson, Donald.
Merritt, Andrew A.
Merritt, Mary Hope.
Might, Percy G.
Miller, Sinclair Laird.
Moffatt, William John
Morrell, Robert.
Murray, Jessie.
Newcombe, Abram Cook.
Norris, Arthur David.
Nugent, James.
O'Connor, Mary C.
Painter, James Ewing.
Parker, Hugh R
Pound, Minnie B.
Ramsay Charles.
Rea, William.
Shaw, Robert.
Shepherd, Martin Ward.
Smith, Arthur.
Smith, George N.
Smith, Helen Nettie.
Smith, Herbert Hamilton.
Smiley, Charlotte E.
Speers, Albert J.
Stevenson, William James.
Stickle, William Alvy.
Tucker, Gerda M
Waldron, Lottie F.
Welch, John Oswald.
Wigg, S. Edith.
Williams, Albert.
Williams, Joseph L. Total—91.

II.—Second Class.

(*1*) *London Normal School, June, 1901.*

Allan, Katie I.
Amy, Margery.
†*Bailie, John Ashley.
Beveridge, Katie A.
Blacker, Alice K.
Bogle, Margorie.
Botterill, Minnie.
Buchanan, Flora M.
Burwell, Bertha E.
Cameron, Lucy M.
Crowley, Nellie M.
*Culbert, Hulda M.
*Cummings, Jean I.
Currie, John.
Dickinson, Louise.
Dickinson, Mabel.
Dimond, Georgina.
Dinning, Nora E.
Duncan, Ethel L.
Ellsworth. Nellie.
Findlay, Jean R.
Fuller, Agnes Ethel.
Glazier, Mary E
Gunstone, Edith B.
Hair, Eliza.
Hamilton, Jessie A.
Henderson, Arthur.
Herlick, Minnie
Huston, Lottie.
James, E. Carrie.
Jickling, Hester.
Johnston, Emily O.
Jolly, Eliza.
Kelly, Alethea E.
Kelly, Mary V.
Lamond, Fannie.

† Medallist. * Honors.

5. List of Provincial Certificates, etc.—*Continued*

II.—Second Class.—Continued.

(*1*) *London Normal School, June, 1901.*—Continued.

Lawrence, Carrie A.
Lee, Maggie N.
Livingston, Margaret.
Marshall, Henry A.
Millar, Maggie A.
Miller, Minnie F.
Misener, Cora.
Mitchell, Bessie.
Moyer, Laura
Mugan, Frank.
Mullree, Marie.
Munford, C. Edward.
McCormack, Katie.
McCormick, Mary.
McDiarmid, Mary H.
McIntosh, Jean.
McKenzie, Maggie.
McLean, Marie.
*Neale, William J.
Newcombe, Agnes.
Nixon, Bertha.
Payne, Melvin T.
Read, Mary Emma.
Robb, Mary E.
Rodd, Clara.
Rudd, Etta May.
Ruthven, Frances.
Rydall, Walter B.
Ryder, William.
Scott, Lizzie.
Seed Mary M.
Sharp, Bessie.
Smith, Nellie B.
*Stidwill, Frank.
Strachan, Lizzie.
Strathdee, Mary.
*Strongman, Anita.
Sutherland, Marion.
Taylor, Nettie J.
Thatcher, Teva M.
Thomson, Lizzie E.
Tier, Marion.
Waugh, Emily J.
Wiltse, Marion M.

Total—80.

(*2*) *Ottawa Normal School, June 1901.*

Acheson, Mary.
Adams, Edgar.
Adams, Ethel May.
Abister, Charles Walter.
Alexander, Jennie.
Anderson, John.
Atcheson, Mary Louise.
Bird, Maggie.
Beal, Allena Frank.
Blondin, Edith Amey.
Bogan, Mary Frances.
Buchanan, Mary Edith.
Cameron, Adam Kirk.
Campbell, Ella Kate.
Carey, Evelyn Etta.
Chambers, James Everett.
Clazie, Mabel Grieve.
Coll, Sidney.
Coones, Annie Mary.
Cooper Louise.
Coughlan, Grace.
Cowan Jennie.
Cox, Marion.
Crawford. Edith.
Crysler, Jessie.
Cunningham, Florence
Curry, Emma J.
Dale, Ethel Jane.
Doyle, Maggie Anne.
Edgar, George.
Emberley, George Everton.
Fee, Maggie Ellen.
Ferris, Lottie.
Foster, Bertha Matilda.
Gaffield, John Lawson.
Gilson, Rose Emma.
Grant, Belle.
Greer, Annie.
Hagerman, Andrew Ferguson.
Henderson, Rose Beth.
Howes, David Edwin.
Howes, Rueben George.
Hume, Esther.
Hussey, Eva,
Hutchison, Mary.
Ireton, Mary Elizabeth.
Isaac, Gertrude.
James, Beatrice.
Johnstone, Sarah Letitia.
Kerr, Ina.
Lamb, Mary.
Lancaster, Bessie Emily.
Law, William Henry.
Lynn, Joseph.
Malcolm, Etta.
Manhard, Gertrude.

*Honors †Medallist

5. List of Provincial Certificates, etc.—*Continued.*

(*2*) *Ottawa Normal School June, 1901.*—Continued.

Martin, Henrietta Orlena.
Martyn, Bertha Maude.
Mills, Gertrude.
Minaker, John Herbert.
Mitchell, Minnie.
Moore, Homer H.
Moynihan, Mary.
Munford, Emma Maude.
MacDonald, Cassie.
MacLeod, Mary Belle.
MacTavish, Kate.
MacBride, Mabel.
McClelland, Samuel Ernest.
McCreary, Maggie.
McGillis, Jane Frances.
McGillivray, Nellie.
McIntosh, Arza, D.
McKay, Edith Gertrude.
McKechnie, Edith Helen.
McKibbon, Lulu Kathleen.
McKinley, Nessie Flood.
McLaughlin, Sara Jane.
Moonan, George Albert.
Paterson, Ida Louise.
Pratt, Thomas Alfred.
Render, Ida Marcella.
Robertson, Amy.
Robson, Mary.
Rock, Annie Cellstine.
Ronan, Ethel.
Rooney, Minnie Harriet.
Rosa, Lavina.
Rutherford Alice.
Shirley, Agnes.
Smith, Euphemia Elizebeth.
Spence, Peter McMillan.
Stinson, Frederick Henry.
†*St. Charles, Minnie.
Taylor, Maggie Dobbie.
Tolmie, Sara Anne.
Tooley, John Alyssius.
Warren, Annie Emeline.
Weir, Julia McKinnon.
Wildman, Scott Wesley.
Williams, Thomas Edward.
Wilson, Mary Elizabeth.

Total—102.

(*3*) *Toronto Normal School, June, 1901.*

Apps, Mary Overy.
*Argue, William.
Armstrong, Ida F.
Arnold, Hattie G.
Asher, Ella Elizabeth.
Atkinson, John S.
Bassett, Dora S.
Beattie, Ada Louise.
Bedford. Clara Jane.
Birchard, Emma.
*Birchard, Jemima.
Bolster, May Louise.
Bonham, Sara M.
Box, S. Grace.
Boyes, Barbara H.
Brisbin, Charles N.
Brodie, Lizzie.
Brown, Ella Gertrude.
Brown, E. Lillian.
Byers, Lucy.
*Byrch, S. Frances.
Caldwell, Helen.
Case, Maretta M.
Caslor, Annie Ida.
Clarke, Etta.
Clarke, William I.
*Copplestone, Edna.
*Corley, Bertha Leila.
Cronk, M. Allegra.
Damude, Edgar H.
Deane, Olive M.
De Clair, Margaret L
*Derbyshire, F. Elma.
Dickson, M. Bell.
Dodds, Lizzie.
Donoghue, Margaret E.
Doyle, Ruth.
Dunoon, Helen A.
Elliott, Mabel M.
Findlay, Jane.
Foster, Maggie.
Graham, Mary Jane.
Green, Hilda T.
Hall, Merton E.
*Halligan, William Thomas.
Harnbridge, Herbert Charles.
Hawken, Lizzie Celina.
Hawker, May Jeannette.
Howard, Anna B. C.
Hurlburt, Lucy.
Irvine, Edith M.
*Johnston, Llewellyn H.
Kay, Mary Agnes.
Kelly, Christine Agnes.

* Honors. † Medallist.

5. List of Provincial Certificates, etc.—*Continued.*

(*3*) *Toronto Normal School, June, 1901.*—Continued.

*Kerns, Gertrude C.
Lamont, Ella Grace.
Lang, Ida Maud.
Laventure, Laura.
*Lindsay, Jean Gordon.
Lott, Lizzie.
Lousley, Laura R.
Lyons, Gertrude.
Marlin, James.
Marritt, Celenna.
Maxwell, John.
May, Mabel Amanda.
Moyse, Norman M.
Munro, Edith M.
MacInnes, Hannah.
Mackenzie, Archie G.
Mackenzie, Fannie C.
*MacStephen, Nellie.
McCaffrey, Libbie E.
*McCaffrey, Mary B.
McCammon, Esther J.
McCordic, Frank M.
McCormick, Daniel.
McCrea, Anna Isabel.
McDonnell, Michael J.
McEachern, Margaret.
McIntosh, Alexander J.
†*McKenna, Clara.
McLachlan, Hattie L.
*McLachlan, Maud.
McLean, Lillie.
McLeod, Gertrude.
McMeekin, George.
McMillan, Flora.
McNaughton, Minnie.
McQuaid, Thomas.
McQueen, Eliza Head.
Nixon, Frederick.
*Oxley, Gertrude E.
Peart, Jacob Baxter.
Pennington, Evea L.
Porte, Florence M.
Putherbough, Cassie.
Reuter, Emma.
Roberts, Evelyn J.
Robinson, Leonard.
Robson, Lillian.
*Sitzer, Annie.
Smith, Maggie.
Smith, Violet.
Staples, Addie.
Stephenson, Ethel.
Stewart, Ethel.
Stewart, Rachel.
Strain, Mabel E.
*Stretton, Eva.
Switzer, Mabel Clara.
Tasker, Lena M.
Tegart, Ella
Thompson, Florence M.
Thompson, Lizzie.
Thompson, Martha.
Tran, John Milton.
Trueman, Loftus A.
Waddell, Annie L.
Weir, Elizabeth.
Weir, Lizzie Mary.
*Wilker, Christina M.
Wilkins, Martha A. H.
*Wixon, Martha Esther.
Wood, Callista.
Wood, M. Imogene.
*Ziegler, Ethel.

Total– 127.

(*4*) *London Normal School, December, 1901.*

Alexander, Harry J.
Alexander, Margaret.
Anderson, Agnes.
Augustine, Evelyn V.
Aylesworth, Robert P.
Baldwin, Alexander.
Balsdon, Eva.
Barassin, Susie.
Beatty, Johnson.
Beatty, William A.
Bell, Mary.
Bell, Thomas H.
Benn, Delia A.
Bentley, Lottie.
Black, A. Isabel.
Bluett, Claude.
Brandon, Robert.
Claris, Lena M.
Clifford, Margaret.
Copland, Annie L.
Cunningham, Lienetta.
Darling, Robert H.
Deacon, Maggie M.
Devlin, Lizzie A. B.
Dowd, Hattie.
Exelby, Agnes.
Frazer, Gertrude E.
Galbraith, Duncan G.

*Honors. †Medallist.

5. List of Provincial Certificates, etc.—*Continued.*

(*4*) *London Normal School, Dec. 1901.*—Continued.

Geiger, Edmund.
Gilchrist, John.
Gillies, Hugh.
Girard, Beatrice L.
Goodale, Marion.
Gordon, Lena.
Hillis, James.
Hunter, Mrs. Harriet I.
Kee, Mary M.
*Kelly, J. Wilfred.
Little, Jennie.
Lockhart, Nina E.
Loney, Frances I.
Lundy, Ada K.
Meredith, Amelia.
Miller, Edith J.
Milliken, Minnie.
Milne, E. Isabelle.
Moreland, Agnes L.
Morrison, Edyth.
Morrison, James E.
Mummery, Carrie A.
Murphy. Maggie.
McCoig, Lizzie.
†*McCutcheon, Maude.
McDougall, Alexander.
McIntosh, Alice.
McKay, Carrie J.
MacKay, Hugh C.
McKechnie, Phoebe R.
McKinnon, Belle M.
McLean, Eliza.
McNab, Isabel.
McPhedran, Annie D.
Noonan, Sarah.
O'Meara, Ambrose P.
Patterson, Elnora.
Pfrimmer, Eva C.
Redman, Edith M.
Redman, Maggie L.
Riddell, Clara.
Robinson, Alberta M.
Rogerson, John A.
Rowe, Sarah J.
Russell, Laney.
Ryerse, Elva.
Scanlan, Lizzie.
Scott, John M.
Scott, Marion.
Sherk, Mabel E.
Smale, Isima B.
Smith, Albert E
Stacey, Charlotte.
Stewart, Edna A.
Stout, Alice.
Stout, Willa
Thompson, Ella.
Thorburn, Aggie.
Verner, Eleanor A.
Watters, Agnes.
Wilson, Eliza J.
Young, Georgina.
Zavitz, Bertha M.

Total—91

(*5*) *Ottawa Normal School, December, 1901.*

Anderson, Frank Arthur.
Anderson, Janet.
Anderson, Lavina May.
Armstrong, Emma Louise.
Brown, Florence.
Buell, Laura Irene.
Burke, Margt. Elizth.
Campbell, Laura Ethel.
Campbell, Minnie.
Cheney, Emma Ethel.
Clarke, David Wesley.
Clarke, Robt. Wellington
Clarke, William Alex.
Clough, Viola Rebecca G.
Cram, Lizzie.
*Cree, Matthew.
Crispin, Martha Maria.
Dack, Lottie May
*Dowdall, Bernadette.
Eagleson, Mabel J.
Faber, Andrew Henry.
Fife, Ida Elizabeth.
Godfrey, Annie Thompson.
Grass, Lottie.
Griffith, Margt Lake.
Hamilton, Livingston.
Healy, Maymie.
Hollisten, Stella.
Hunt, Mabel.
James, Elizabeth Eleanor.
Jemmett, Dulcibel
Johnston, Gertrude.
Kennedy, Emily.
Kidd, Fenella.
Lehmann, Ada.
Low, Grace Effie.
Mader, Frances Enid.
Mattice, Cleas Salathiel.

*Honors †Medallist.

5. List of Provincial Certificates, etc.—*Continued.*

(5) *Ottawa Normal School, Dec. 1901*—Continued.

Maxwell, Thos. Patterson.
Mitchell, Jennie Ethel.
Moffatt, Cath. Aletta.
Montgomery, Florence Annie E.
†*Muir, Jessie
MacDonald, Laura.
McCann, Elizbth. Helen.
McCulloch, William Geo.
McGillis, Joseph
McGuire, John Matthew H.
McKeown, William Alfred.
McLean, Margt. Johnston.
McMeekin, Albert.
O'Connor, Fergus Joseph.
O'Donnell, Elizth.
O'Reilly, Lillian.
Peterson, Morly B.
Potter, Mildred Jennie.
*Robertson, Albert Duncan.
Rodger, Libbie.
Rogers, Mary.
Rutherford, Winetta Ethridge.
Ryan, Katie Mary.
Scollard, Lizzie.
Seguin, Eugenie Marie.
Sloane, Maria.
Smith, Bessie.
Smithson, Sidney J. A.
Sproule, Margt. Maude.
Stephens, Lottie.
Stewart, Marjorie.
*Story, Lodema.
Sykes, Stella.
Thompson, Hannah Jennie.
Thomson, Mabel Alberta.
Thomson, Nettie.
Troy, Mary Cath.
Walker, Mary Edith.
Whitmore, Nellie.

Total—77

(6) *Toronto Normal School, December, 1901.*

Abraham, Millie Emily.
Addy, Maude Evelyn.
Aitken, Minnie
Armstrong, Lottie.
*Armstrong, James.
Baillie, Bessie.
Beamish, Stella Swanton.
*Berry, Lillian Edith.
*Bodwell, Ethel Sutherland.
Bricker, James G.
Brown, Frances Mary.
Bruce, Wesley William.
Campbell, Marguerite Eliz'th.
Chappell, Mabel.
Charlton, Winifred May.
Clark, Winifred Marietta.
Clarke, Edna Emily B.
Clay, Emily May.
Clayton, Edith Blanche.
Clendenning, Ethel May.
Close, Maud A.
Cochrane, Mamie Florence.
Coveney, Florence E
*Cowan, Daisy Clemestia.
Davidson, James Austin.
Davis, Lilian.
*Dewey, William G.
Douglas, Etta May.
*Dyer, Albert Francis
Edwards, Robt. Geo.
Fee. Henrietta.
Fleming, Roy Franklin.
Fraser, Maggie Amelia.
Galloway, Jennie.
Gordon, Annie Laura.
Graham, Maggie.
Grant, Gertrude.
Grant, Jean Alfretta.
Green, Alfred Geo.
Griffiths, Llewella M.
Hall, Hattie.
*Hamilton, Lizzie Belle.
Hardy, Geo. Burton.
Horton, Maude Annie.
*Houser, Laura Agnes.
Howie, Frances Jean.
Hubbard, Albert E
*Hutchinson, Annie May.
Jackson, May Elizabeth.
Jamieson, May.
*Johnston, Barbara A.
Johnston, Mary.
Kidd, Andrew Richard.
Lailey, Emily Maude.
Lawrence, Annie Gertrude.
Lenhard, Kate.
Lindsay, Edwin Herman.
Libster, David Strathern,
Lundy, Frances Louise.
Macaulay, Jessie Thorne.
*Madill, Joseph Henry.
Marriott, Wm. Clare Newell.

* Honors. † Medallist.

5. List of Provincial Certificates, etc.—*Continued.*

(6) *Toronto Normal Schools, Dec. 1901*—Continued.

*Matthews, Nano.
Merrill, Lillian Florence.
Millar, Ida Valentine.
Millard, Edna Louise.
†*Miller, Mrs. Anna Hermine.
Mitchell, Laura Irene.
Mitchell, Mary.
Montgomery, Harriet Jane.
Morden, Una.
Morrow, Frances.
Murrich, Minnie.
MacLean, Alice.
*MacNichol, Mary Margaret.
*McCall, Agnes.
*McColl, Louise Emaline.
McFarlane, Agnes M.
McGill, Garfield.
McKay, Lottie Goff.
*McLean, Rachel.
McMillan, Edith.
McMillan, Isabel.
McPhatter, Minnie.
McQuade, Nellie O.
*Nethercott, Lottie May.
*Nighswander, Gertrude.
O'Hare, Maude.
*Orton, Wilfred Richard.
Packenham, Annie.
Pascoe, Louie.
*Paul, Ethel Graham.
Pepper, Mary Cora.
Phillips, Edith.
Phillips, Mabel M.
*Philp, Bessie M.
Poole, Fanny.
Pride, Margaret R.
Reid, Harriette.
*Richardson, Ada May.
*Ricketts, Harriet White.
Riddall, Ethel Blanche.
*Robertson, Ella May.
Robinson, Florence Pingle.
Rolston, Katie Estella.
Root, Milton.
Shand, May Calder.
Smith, Katie Annie.
Smith, Mabel.
Softley, Ethel V. A.
Sproule, Clare.
Staples, Hannah.
*Stephen, Mary.
Stretton, Lilian.
Sturgeon, Katie.
Swanson, Bella.
*Thompson, Mabel Elizabeth.
Trebilcock, Ethel Margaret.
*Turnbull, Isabell Grace.
Vollmer, Francis Joseph.
Waterman, Frances.
Weldon, Anna.
Wilson, Isabel.
*Wilson, Marg't.
*Young, Marion Thompson.

Total—125.

(7) *Second class certificate granted under sub-section 8 of section 4, cap. 291, R.S. O. 1897, as amended 1901.*

Barker, John

6. Kindergarten Certificates, 1901.

Directors.

Allan, Maud H.
Anderson, Alice M.
Anglin, Frances.
Chamberlain, Florence.
Chamberlain, Lillian.
Coates, Emma L.
Copeland, Annie.
Davids, Hilda.
Dyke, Eunice H.
Galloway, Ruby I.
Hotson, Maud.
Kittredge, Belle Stuart.
Loucks, Grace.
Mansell, Florence A.
Mackie, Emma L.
Millichamp, Florence.
Moore, Augusta.
Somerville, Mary Guthrie.
Whiteside, Katie.
Wigle Collnette V.
Wilson, Edith.
Wilson, Grace E.
Woods, Lexie H.

Total—23.

* Honors. † Medallist.

Assistants.

Alexander, Minnie V. A.
Bain, Agnes W.
Bapty, Gertrude.
*Bell, G. Florence.
Braiding, Annie M.
Bryan, Christine.
Bull, Alice M.
Burritt, Gwendoline.
Cavers, Agnes Galt.
Cole, Clara Mildred.
Currie, Katharine E. G.
Darnbrough, Bessie A.
*Donell, May.
Drew, Annie.
Forsyth, Lillian H.
Freeman, Elsie.
Green, Matilda L.
Groff, Emilee Jean.
Hendry, Mary D.
Howie, Ethel B.
Johnson, Ethel.
Knox, Ethel M.
Kumpf, Mary.
Leavens, Ethel M.
Lennox, Eva M.
Macpeak, Bessie.
McOlean, Edythe A.
McLeod, Helen.
Mallaby, May.
Meek, Gertrude Margaret.
Nash, Isabella M.
Neish, Laura.
Owen, Myfanwy Prevor.
Perry, Adelaide,
Ross, Mary Winnifred.
Rowand, Edith K.
Smith, Effie H.
Stewart, Lottie.
Stoddard, Jenny.
Westman, Hattie.
Westman, Alice M.

Total—41.

7. Domestic Science, 1901.

Briggs, Maud.
Butchart, Ada M.
Donaldson, Janet.
Foote, Patricia M.
Given, Helen.
Grant, Ethel.
Hagar, Grace E.
Jackes, Margaret.
McIntosh, Christina G.
Scott, Mabel.
Shepherd, Belva.
Smith, Agnes.
Spier, Louie.
Tennant, Dora E.

Total—14.

* Honors.

8. Temporary and Extended Certificates Issued During 1901.

Counties, etc.	Temporary certificates authorized by the Minister of Education during the year.	Third Class certificates extended by the Minister of Education during the year.
Bruce	4	2
Dundas	2	
Elgin		1
Essex	10	1
Frontenac	34	
Glengarry	8	
Grey		1
Haldimand	1	
Haliburton		2
Kent		1
Lambton	6	3
Lanark	4	2
Leeds	1	1
Lincoln	1	
Middlesex	1	1
Norfolk	4	2
Ontario		2
Perth	1	
Prescott and Russell	3	
Prince Edward		7
Renfrew		1
Stormont		1
Victoria	11	11
Welland		1
Western Ontario R.C.S.S's.	1	3
Central Ontario "		1
Eastern Ontario "		1
Districts	44	3
Totals 1901	136	48
" 1900	66	22
Increase	70	26

9. Professional Examination, 1901.

—	Kindergarten Assistants.	Kindergarten Directors.	Co. Model School.	Normal Schools.	Normal College.
No. of candidates	148	137	1,189	605	171
No. who passed	38	23	1,145	602	151
No. of appeals	11	3			8
Appeals sustained	4				4

APPENDIX S.

MEMBERS OF THE EDUCATIONAL COUNCIL AND BOARDS OF EXAMINERS: LISTS OF ASSOCIATE EXAMINERS AND HIGH SCHOOL PRINCIPALS AND ASSISTANTS.

1. Members of the Educational Council 1901-1902.

Under the provisions of section 6, cap. 291, R.S.O., 1897, the following gentlemen were appointed members of the Educational Council:

G. H. Armstrong, M.A., B.Paed., Principal of Borden Street Public School, Toronto.
The Rev. N. Burwash, M.A ,LL D., Chancellor of Victoria University.
Alfred Baker, M.A., of Toronto University.
The Rev. William Clark, M.A , D C.L ,F.R S.C., of Trinity University.
The Rev. J. H. Farmer, B.A.,LL.D., of McMaster University.
Cortez Fessenden, M.A., Principal of Collegiate Institute, Peterborough.
Maurice Hutton, M.A., Principal of University College.
A. P. Knight, M.A.,M.D., of Queen's University.
James Loudon, M.A., LL D., President of the University of Toronto.
A. B. MacCallum, B.A.,Ph.D., of Toronto University.
The Rev. J. R. Teefy, M.A , LL.D., Principal of St. Michael's College.
W. Tytler, B.A., Public School Inspector, Guelph.

2. Boards of Examiners for 1901.

(1) Public School Leaving or Part I. Junior Leaving Board.

W. H. Ballard, M.A., I.P.S., Hamilton,
A. Carruthers, M.A., Toronto University.

(2) High School Leaving and University Matriculation Board.

W. J. Alexander, Ph.,D., Toronto University.
R. R. Bensley, B.A., Toronto University.
J. H. Cameron, M.A., Toronto University.
Pelham Edgar, Ph.D., Victoria University, Toronto.
W. L. Goodwin, D.Sc., Queen's University, Kingston.
G. W. Johnston, Ph.D., Toronto University.
A. L. Langford, M.A., Victoria University, Toronto.
F. W. Merchant, M.A., Principal Normal School, London.
J. Macgillivray, Ph.D , Queen's University, Kingston.
A. C. McKay, B.A., McMaster University, Toronto.
A. B. Nicholson, B A., Queen's University. Kingston.
A. Odell, I.P.S., Cobourg.
W. Prendergast, B A., Toronto.
G. M. Wrong, M.A., Toronto University.
A. H. Young, M.A , Trinity University, Toronto.

(3) Commercial Diploma Board.

J. H. Packham, B.A., Owen Sound.
E C. Srigley, Woodstock.

(4 Commercial Specialist Board.

J. D. Conklin, Ottawa.
W. Ward, Kingston.

(5) Kindergarten Board.

Miss E. Cody, Toronto Normal School.
J. L. Hughes, I.P.S., Toronto.
Miss Jean Laidlaw, London.
Miss Jessie Stocks, Ottawa Normal School.

(6) Normal School Board.

R. H. Cowley, M.A., I.P.S., Ottawa.
W. E. Groves, Toronto.
A. A. Jordan, Prescott.
D. A. Maxwell, M.A., LL.B., Ph D., I.P.S., Windsor.
L. E. Staples, M.A., Kingston.
J. R. Stuart, I.P.S., Stratford.
J. Suddaby, Berlin.

(7) Examiners in Practical Teaching at the Normal Schools.

N. W. Campbell, I.P.S. ..... Durham.
W. J. Carson, I.P.S. ..... London.
A. B. Davidson, B.A., I.P.S. ..... Newmarket.
J. S Deacon, I.P.S ..... Milton.
W. Irwin, B.A., I.P.S ..... Stratford.
W. Johnston, M.A., I.P.S ..... Athens.
J. H. Knight, I.P.S ..... Lindsay.
J. McBrien, I.P.S. ..... Prince Albert.
D. McDiarmid, M.D., I.P.S ..... Maxville.
Rev. Thos. McKee, I.P.S ..... Barrie.
R. Park, I P.S. ..... Chatham.
W. J. Summerby, I.P.S ..... Russell.
J. J. Tilley, I.C.M.S. ..... Toronto.

(8) Normal College Board.

G. H. Reed, B A, B. Paed ..... Markham.
S. Silcox, B.A., B. Paed ..... St. Thomas.
A. W. Burt, B.A ..... Brantford.
E. Coombs, B A, B. Paed ..... Newmarket.
J. H. Brethour, B.A. ..... Mt Forest.
C. J. Logan, M.A ..... Galt.
J. Jeffries, B.A ..... Peterborough.
A. Stevenson, B.A. ..... Stratford.
J. A. Houston, M.A. ..... Smith'sFalls.
R. A. Gray, B.A ..... Toronto
W. C. Ferguson, B.A ..... London.
Miss E. Balmer, B.A ..... Toronto,
E. L. Hill, B.A ..... Guelph.
J. A. Fife, B.A ..... Peterborough.

(9) Model School Board.

E. D. Parlow, M.A ..... Ottawa.
Miss M. T. Scott ..... Toronto.
J. F. White ..... Toronto.

(10) Art School Board.

W. D Blatchley ..... Toronto.
F. H. Brigden ..... Toronto.
A. C. Casselman ..... Toronto.
R. Gagen ..... Toronto.

(10) Art School Board.

Miss M. May ..... Toronto.
Rev. Bro. Maxentius ..... Toronto.
M. Matthews ..... Bracondale.
T. R. Roseburgh ..... Toronto.
W. A. Sherwood ..... Toronto.
F. M. Bell-Smith ..... Toronto.
L. R. Stewart ..... Toronto.
C. H. C. Wright ..... Toronto.

(11) Domestic Science Board.

Miss Harriet Norris ..... Toronto.
Miss N. C. Ross, B.A ..... Toronto.

3. Associate Examiners, 1901.

(a) Junior Leaving Part I. or Public School Leaving.

Arithmetic.

Andrus, G ..... London.
Caverhill, A. E ..... St. Catharines.
Innes, A. R ..... Pt. Elgin.
Keogh, L. R ..... Pembroke.
Millar, J ..... Toronto.
Nugent, J ..... Cornwall.
Rice, J ..... Aurora.
Wilson, W ..... Toronto Junction.
Wright, W. G ..... Hawkesbury.

English Grammar.

Attwood, A. E ..... Ottawa.
Barber, A ..... Brampton.
Bridgman, Clara ..... Smithville.
Burchill, J., B.A ..... Cobourg.
Cameron, J. H ..... Brussels.
Charters, W. W., B.A ..... Hamilton.
Grant, Rev. Geo., B.A ..... Orillia.
Harvey, W. B ..... Sydenham.
Hinde, E. W., B.A ..... Toronto.
Langford, T. E., B.A ..... Tottenham.
Leary, J. L ..... Toronto.
McArthur, Christina ..... Pt. Perry.
McDougall, J. B, B.A ..... North Bay.
McIntosh, A ..... Toronto.
O'Brien, Lizzie ..... Alexandria.
Parlee, Edith ..... Clinton.
Rose, C ..... Ottawa.

English Grammar.

Shaw, J	Blyth.
Suddaby, J	Berlin.
Talbot, H. J	Beamsville.
Ward, E	Collingwood.
Waugh, J., D. Pæd	Whitby.
White, R. O	Gore Bay.
Young, D	Guelph.

History.

Boyd, S. J	Exeter.
Brown, J. C	Peterboro.
Bulmer, J. R	Toronto.
Burke, A	Brighton.
Campbell, J	Forest.
Davidson, Jean	Renfrew.
Evans, W. A	Lakefield.
Giles, Edith	Brockville.
Gray, H	Toronto.
Jones, E	Peterboro.
Kinney, R., M D	Brockville.
Laven, Adelaide F	Welland.
Leighton, R. H	Weston.
Little, J	Drumbo.
McEwan, J. S	Ottawa.
Miller, G. A	Dresden.
Panton, Jessie	Oshawa.
Platt, G. D., B.A	Picton.
Pottinger, Sylvia	Sarnia.
Rundle, J. A	Mountain View.
Sorsoleil, M. A	Peterboro.
Staples, L E., M.A	Kingston.
Thompson, R	Athens.
Ward, H	Toronto.
Wilkinson. W., M.A	Brantford.

Geography.

Campbell, J. D	Highgate.
Currie, A. M	Parry Sound.
Evans, J. J	Toronto.
Hamilton, W. J	Owen Sound.
Kidd, W. L	Woodbridge.
Meade, R., M.A	Ottawa.
McDiarmid, H. F	Ingersoll.
McRae, Jessie	Belleville.
Moir, M. Annie	Barrie
Taylor, L	Lindsay.
Ward, W	Kingston.

Composition.

Aitcheson, Belle	Waterdown.
Barr, Lydia	Uxbridge.
Bryce, Walter, B.A	Toronto.
Chapman, W. F	Toronto.
Craig, J. J., B.A	Fergus.
Davidson, Margaret	Hamilton.
Edwards, C. H., M.A	Napanee.
Forham, J. H	Newmarket.
Graham, R. M	London.
Higginson, Maria A	Hawkesbury.
Kelly, M. J., B A	Brantford.
Moshier, D. D., B.A	Sarnia.
White, J. F	Toronto.

(*b*) *Junior Leaving Part II. and Pass Matriculation.*

English Grammar.

Ackerman Effie, B.A	Picton.
Bishop, C. P., B.A	Athens.
Hardy, E. A., B.A	Lindsay.
Keillor, J., B. A	Ridgetown.
Kirkwood, Florence, B.A	Seaforth.
McKay, D., B.A	Alexandria.
McManus, Emily, M.A	Niagara Falls South.

English Literature.

Carter, Janet, B.A	Elora.
Dingle, Grace, B.A	Meaford.
Foik, H, J	Colborne.
Howard, E. S., B.A	Brampton.
McCool, J., M.A	London.
Morrow, J. D., B A	Glencoe.
Pattee, Mrs. Ada	Trenton.
Skinner, Kate, B.A	Guelph.
Steele, A., B.A	Orangeville.
Thompson, Margaret J., B.A	Almonte.

English Composition

Cleary, Nora, B.A	Windsor.
Foster, Jessie	Welland.
McKim, W. A., B.A	Prescott.
Mowat, A, B.A	Brockville.
Peacock, E. R., B.A	Deer Park.
Ross, R., B.A	Pembroke.
Willson, Alice, B.A	Toronto.

History.

Brown, L., B.A. ..... Aylmer.
Carstairs, J. S., B.A. ..... Toronto.
Fife, Mary, B.A. ..... Peterboro.
Foucar, W. K., B.A. ..... Bradford.
McLean, Allan, B.A. ..... Cornwall.
McMurchy, R. D., B.A. ..... Chesley.
Miller, Nannie ..... Markham.
Neelands, Florence, B.A. ..... Toronto.
Robertson, W. J., B.A. ..... St. Catharines.
Simpson, B. S. ..... Collingwood.
Spence, Nellie, B.A. ..... Toronto.
Thompson, J. F., B.A. ..... Simcoe.

Arithmetic

Doidge, T. C., B.A. ..... Orillia.
Knight, W. W. ..... Belleville.
Morgan, J. J., B.A. ..... Omemee.
Overholt, A. M., B.A. ..... Woodstock.
Wooster, Thyrza B.A. ..... Toronto.

Euclid.

Boyes, R. ..... Campbellford.
Frost, F. H., B.A. ..... Bowmanville.
Hay, A. ..... Barrie.
Myer, A. N. B.A. ..... Beamsville.
Rudlen, G. W., B.A. ..... Arnprior.
Scovell, R. H., B.A. ..... Orillia.

Algebra.

Carmichael, N. R., MA ..... Kingston.
Hogg, J. L., B.A. ..... Seaforth.
McPhail, A. C., B.A. ..... Almonte.
Whyte, R., B.A. ..... Deseronto.

Classics.

Baines, A. W., B.A. ..... Wiarton.
Bennett, C. V., B.A. ..... Barrie.
Caesar, L., B.A. ..... Pt. Hope.
Dundas, A. A., B.A. ..... Meaford.
Farquharson, R. A., B.A. ..... Richmond Hill.
Fitzgerald, Eliza, B.A. ..... Cornwall.
Kirkwood, W. A., B.A. ..... St. Catharines.
Luton, J. T., B.A. ..... Belleville.
Menge, G. J., B.A. ..... Toronto.
Robinson, P. J., B.A. ..... Toronto.
Stoddart, R., B.A. ..... Listowel.
Tasker, L. H., M.A. ..... Almonte.
Will, G. E., B.A. ..... Orangeville.

French and German.

Addison, Margaret, B A ..... Lindsay.
Allin, Elizabeth, B.A ..... Glencoe.
Annis, Mary, B.A ..... Markham.
Armour, Amy A ..... Almonte.
Brown, H. W., B A ..... Peterboro.
Galbraith, W. J , B.A ..... Brampton.
Gardiner, Ella, B.A ..... Belleville.
Hendrick, A. W., B.A ..... Picton.
Jones, G. M., B A ..... Hagersville.
Kirkman, Mrs. B ..... Seaforth.
Libby, Minnie, B A ..... Parkhill.
Marty, Sophie E., M.A ..... Stratford.
Riddell, Agnes, B.A ..... Oshawa.
Tapscott, H. B., B A ..... Toronto.

Physics.

Anderson, G. R , B A ..... Toronto.
Carefoot, G. A ..... Collingwood.
Carr, W. R., B.A ..... Toronto.
Lee, S. C., B. A ..... Orangeville.
Reid, M. R , M.A ..... Napanee.
Stuart, F. A., B.A ..... Lucan.
Taylor, J. A., B.A ..... Dutton.
Thomson, R. B., B A ..... Prescott.
Witherill, E. R., B.A ..... Williamstown.

Chemistry.

Campbell, D. A., B.A ..... Ottawa.
Conn, H., B.A ..... Strathroy.
Morgan, J., B A ..... Smith's Falls.
Power, J. F , B A ..... Simcoe.
Rogers, G. F., B.A ..... Seaforth.
Simpson, H. C., B.A ..... Toronto.
Smellie, W. K. T., B.A ..... Deseronto.
Thompson, P. M., B.A ..... Whitby.
Young, W. D., B.A ..... Toronto.

(*c*) *Senior Leaving and Honor Matriculation.*

English.

Charles Henrietta, B.A ..... Toronto Junction.
Field, J. M., B.A ..... Goderich.
Lawler, Gertrude, B.A ..... Toronto.
Morgan, J., B.A ..... Walkerton.

History.

Gundy, H. W., B.A ..... Toronto.
Dobbie, W. J., M.A ..... Guelph.

Mathematics.

Dawson, H. J., B.A. ..... Kingston.
Griffin, A. D, B.A. ..... Woodstock.
Murray, T, B.A. ..... Owen Sound.
Rand, W E, B A ..... Clinton.

Classics.

Bragg, T. G, B.A. ..... Bowmanville.
Jolliffe, R. O. B.A ..... Owen Sound.
Mitchell, G. W, B.A. ..... Cobourg.
Stubbs, S. J., B.A. ..... Smith's Falls.
Teakles, W. B. H., B.A. ..... Woodstock.

French and German.

Bunnell, Effie, B A. ..... Brantford.
Horning, L. E, Ph. D ..... Toronto.
Marty, Aletta E., M.A. ..... St. Thomas.
Van Every, J. F. B.A. ..... Napanee.

Science.

Cohoe, B., B.A. ..... Toronto.
Kilmer, E. E ..... Aylmer.
Scott, F. H., Ph. D ..... Toronto.

4. List of Principals and Assistants of Collegiate Institutes and High Schools, January, 1902

Collegiate Institutes.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
Aylmer	Rutherford, Walter W	B.A., Tor	Math	1883	$1,400
	Phelps, Frances G	B.A., Tor	Eng., Hist., Fr., Gr	1896	700
	Brown, Lyman	M.A., Tor	Class	1899	800
	Kilmer, Ernest E C		Sci	1899	850
Barrie	Redditt, Thomas H	B.A., Tor	Eng., Hist., Fr., Gr	1893	1,500
	Hay, Andrew		Math	1882	1,000
	Minns, James Edward	B.A., Vic	Math., Sci	1893	1,000
	Moir, Mary Annie		Commercial (Interim)	1895	700
	Aubin, Alfred L	B.A., Oxford	Class	1901	750
	Hinch, Nicholas E	B.A., Tor	Eng., Hist, Fr., Ger	1901	700
Brantford	Burt, Arthur William	B.A., Tor	Eng., Hist., Fr., Gr	1893	1,800
	Passmore, Samuel F	M.A., Tor	Class	1885	1,100
	Hoag, James P	B.A., Queen's	Eng., Hist., Math	1893	1,100
	Coates, Daniel Harsum	B.A., Tor	Math	1893	1,100
	Bunnell, Effie Maria	B.A., Tor	Eng., Hist, Fr., Ger	1891	1 100
	Hamilton, James Reid	B.A., Tor	Sci	1893	1,100
	Shultis, Adam		Commercial	1896	1,100
Brockville	Mowat, Alexander	B.A., Tor	Eng., Hist. (Interim)	1901	1,500
	Copland, James Stuart	B.A., Tor. ; M.A., McMaster	Sci	1889	1,000
	Bryan, Hugh Wallace	M.A., Queen's	Class	1901	1,000
	Husband, Almeron Judson	B.A., Tor	Fr., Ger	1895	1,000
	McGee, Cyril Haughton	B.A., Trin	Math	1897	1,000
	Giles, A. Edith			1890	700
	Richardson, Kate		Commercial	1898	650
Chatham	Paterson, David Smith	B.A., Tor	Eng., Hist., Fr., Ger	1888	1,500
	Twohey, William J	M.A., Tor	Class	1885	1,200
	Taylor, Wilson	B.A., Tor	Math	1894	1,200
	Jewett, Albert E	B.A., Queen's	Sci	1896	1,200
	Lane, James S	B.A., Tor	Fr., Ger	1898	950
	Collins, Henry (Interim)			1902	900
	Mowbray, William	B.A., Tor	Eng., Hist	1899	850
Clinton	Houston, John	M.A, Tor	Eng., Hist., Fr., Ger	1892	1,225
	Rand, Wilfred E	B.A., Tor	Math	1892	950
	McLean, Ebenezer M		Sci	1894	900
	Treleavan, John Wesley	B.A., Tor	Class	1895	900
	Parlee, Edith		Commercial	1898	600
Cobourg	Mitchell, George Winter	M.A., Queen's	Class	1891	1,425
	Arthur, Colin Clayton	M.A., Queen's	Sci	1893	800
	Odell, John William	B.A., Tor	Math	1895	1,000
	Jones, Laura L	B.A., Tor	Eng., Hist., Fr., Ger	1898	900
	Race, Cecil E	B.A., Tor	Commercial (Interim), Math	1900	800

Collingwood	Mills, George K	B.A., Tor.	Sci	1901	1,100
	Hammill, George	B.A., Tor.	Math	1892	950
	Colling, John Knowles	B.A., Tor.	Class	1899	850
	Shepley, Leslie Harmon.....(Interim)		Commercial	1901	800
	Burnham, Archibald Mowbray.	B.A., Tor.	Eng., Hist , Fr., Ger.	1901	650
Galt	Carscadden, Thomas	M.A., Tor.	Eng., Hist	1885	1,750
	Logan, Charles James	B.A., Trin	Class	1883	1,200
	DeGuerre, Ambrose	B.A., Tor.	Math	1890	1,100
	Evans, William Edwin.		Commercial	1892	1,000
	Hamilton, Robert S	B.A., Tor.	Sci	1894	1,100
	Carter, Janet W	M.A., Tor.	Eng., Hist. (Interim), Fr., Ger	1901	850
Goderich	Strang, Hugh Innis	B.A., Tor.	Class	1871	1,300
	Moore, Alvin Joshua	B.A., Tor.	Math	1880	950
	Field, John M	B.A., Tor.	Eng., Hist., Fr., Ger	1900	950
	Grant, Burton D.....(Interim)		Sci	1895	900
	McLellan, Kate			1895	700
	Thompson, William H.....(Interim)	B.A., Tor.	Sci	1901	600
Guelph	Davison, James	B.A., Vic.	Math	1892	1,400
	Hill, Ethelbert Lincoln	B.A., Tor.	Sci	1889	1,000
	Skinner, Kate Clara	B.A., Tor.	Eng., Hist., Fr., Ger	1895	800
	Wilson, Henry Ernest	B.A., Tor.	Class	1895	1,000
	Charlesworth, John William			1888	850
	Dobbie, William James	M.A., Tor.	Commercial	1892	850
Hamilton	Thompson, Robert Allan	B.A., Tor.	Math	1886	1,800
	Turner, John Burgess	B.A., Queen's	Math., Sci	1885	1,400
	Paterson, Andrew	M.A., Trin		1874	1,200
	Crawford, John Thomas	B.A., Tor.	Math	1889	1,200
	Logan, William McGregor	M.A., Tor.	Class	1892	1,200
	Hogarth, Eber Septimus	B.A., Tor.	Eng., Hist., Fr., Ger	1892	1,200
	MacPherson, Frederick Fotheringham	B.A., Tor.	Eng , Hist., Fr. Ger	1894	1,200
	Gill, James	B.A., Tor.	Math	1892	1,100
	Morgan, Sydney Albert	B.A., D. Paed, Tor.	Class	1891	1,100
	Davidson, Margaret Cheyne			1876	800
	Asman, Henry Oldrid Evison	B.A., London, Eng.		1892	1,000
	Overholt, Arthur Milton....(Interim)	M.A., McMaster	Math	1901	800
	Johnston, George Lang	B.A., Queen's	Commercial (Interim)	1888	800
	Morgan, Harriet Emma			1897	550
	McArthur, Edith Mary.....(Interim)			1901	550
Ingersoll	Briden, William	B.A., Queen's	Class., Eng., Hist	1886	1,200
	Gundry, Arthur P		Sci	1894	1,000
	Cameron, John Shaw		Math	1898	900
	Norman, Lambert	B.A., Tor.	Eng., Hist., Fr., Ger	1897	900
	Bowes, Ella D.....(Interim)	B.A., Tor.	Eng., Hist., Fr., Ger	1901	700
Kingston	Ellis, William Stewart	B.A., Vic.	Math., Sci	1893	1,800
	Sliter, Ernest Oscar	M.A., Tor.	Class	1888	1,200
	Dales, John Nelson	M.A., Tor.	Eng., Hist., Fr., Ger	1889	1,200
	Lingwood, Frederick H	M.A., Trin	Class	1894	800
	Sills, William Ryerson	M.A., Queen's	Math	1897	1,100
	Sexton, James Henry		Sci	1898	800
	Ward, William		Commercial	1898	900
	Duff, James	M.A., Queen's	Eng., Hist	1899	1,000

4. List of Principals and Assistants of Collegiate Institutes and High Schools, January, 1902—*Continued.*

Collegiate Institutes.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
Kingston (*continued*)	Errett, Charles F			1901	$ 800
	Iler, A. Grace (Interim)	B.A., McMaster	Class., Eng., Hist.	1902	700
Lindsay	Harstone, John C	B.A., Tor	Math	1886	1,400
	Stevens, William H	B.A., McGill	Sci	1889	1,100
	Hardy, Edwin A	B.A., Tor	Eng., Hist., Fr., Ger	1889	1,100
	Addison, Margaret Eleanor T	B.A., Vic	Eng., Hist., Fr., Gr	1901	1,000
	Colling, James	B.A., Tor	Class	1894	1,100
	Taylor, Luther W		Commercial	1900	900
London	Radcliffe, Samuel John	B.A., Tor	Eng., Hist., Fr., Ger	1891	1,800
	Little, Robert A	B.A., Tor	Class	1886	1,400
	Ferguson, William Chalmers	B.A., Tor	Eng., Hist., Fr., Ger	1892	1,300
	McCool, John	M.A., Tor	Eng., Hist., Fr., Ger	1897	1,150
	McCready, Samuel B	B.A., Tor	Sci	1898	1,150
	Govenlock, William M	B.A., Tor	Math	1898	1,125
	Wilson, Nicholas			1866	1,050
	Andrus, Guy A			1888	1,100
	Edwards, Clarence B	B.A., Queen's	Eng., Hist. (Interim)	1894	1,100
	Riddell, Frank P	B.A., Tor	Class	1898	1,025
	Jones, Samuel S			1892	1,000
	Horton, Charles W	B.A., Queen's	Eng., Hist	1895	1,000
	Dickenson, James A		Commercial (Interim)	1895	1,025
	McCutcheon, Frederick Wm. Caswell.	B.A., Tor	Math., Eng., Hist	1900	1,025
	Voaden, Arthur		Commercial	1898	1,000
	Downing, John Henry			1900	950
	Hanson, Fannie M			1886	800
	Kelso, Alice C			1896	800
Morrisburg	Jamieson, James Smyth	M.A., Vic	Eng., Hist	1882	1,200
	Massey, Arthur Wallace	B.A., Vic	Eng., Hist., Math	1892	850
	Kirkland, William Stuart	M.A., Queen's	Sci	1898	800
	Albarus, Hedwig Selma	B.A., Tor	Fr., Ger	1899	750
	Croskery, Robert Arthur	B.A., Queen's	Class	1899	800
	Dandy, William Percy	B.A., Tor	Commercial (Interim)	1900	750
Napanee	Flach, Ulysses J	M.A., Tor	Math	1900	1,400
	Reid, Marvin Ryckman	M.A., Queen's	Sci	1900	850
	VanEvery, John Fair	B.A., Tor	Eng., Hist., Fr., Ger	1897	900
	Nicol, Margaret A			1891	600
	Smith, Margaret			1891	600
	Deroche, Eleanor Elizabeth. (Interim)	B.A., Tor	Class	1901	700
Niagara Falls	Dickson, James D	B.A., Tor	Math	1893	1,300
	Walker, David McKenzie		Commercial	1893	1,000
	Whyte, David	B.A., Tor	Sci	1900	850

	Fleming, Fthel Catharine	B.A., Tor	Eng., Hist., Fr., Ger	1900	900
	Will, George E. (Interim)	B.A., Tor	Class	1901	800
	Dobbie, Mary (Interim)			1900	500
Ottawa	Macmillan, John	B.A., Tor	Eng.. Hist	1881	2,400
	Jolliffe, Orion John	M.A , Vic	Class	1884	1,700
	McDougall, Alexander Hiram	B.A., Tor	Math	1889	1,700
	Alexander, Luther Herbert	M.A., Tor	Eng., Hist., Fr., Ger	1894	1,550
	Sykes, Wm. John	B.A., Vic	Eng., Hist., Fr., Ger	1894	1,550
	Stothers, Robert	B.A., Queen's		1887	1,200
	Norris, Isaac Taylor	B.A., Queen's	Math	1898	850
	Conklin, James Davidson		Commercial	1894	1,200
	Campbell, Daniel Alexander	B.A., Tor	Sci	1896	1,250
	Graham, Wm. Andrew	B.A., Tor		1895	1,000
	Scott, Bessie Mabel			1892	800
	Macmillan, Herbert Seymour	B.A., Tor	Fr., Gr	1897	900
	Armstrong, Wm. Gilnochie	M.A,, Tor	Eng., Hist., Fr., Ger., (Interim)	1901	700
Orillia	Dickson, John Elder	B.A., Tor	Class., Eng., Hist.	1899	1,300
	Doidge, Thomas Clarke	B.A., Tor	Math., Commercial	1899	900
	Langrill, Adelaide Jane	B.A., Tor	Eng., His., Fr., Ger	1899	700
	Johnston, Fred James	M.A., Tor	Sci	1901	800
	Scovell, Holland R	B.A., Tor	Fr., Ger. (Interim)	1900	600
	Elliott, Robert Leopold (Interim)	B.A., Tor		1901	600
Owen Sound	Jenkins, Wm. H	B.A., Tor	Sci	1890	1,600
	Packham, James Henry	B.A., Vic	Math., Commercial	1884	1,100
	Murray, Thomas	B.A., Tor	Math	1897	1,200
	McKellar, Herbert S	B.A., Tor	Fr., Ger	1898	1,100
	Brough, Thomas Allardyce	B.A., Queen's	Eng., Hist	1893	1,100
	Jolliffe, Richard Orlando	B.A., Tor.	Class	1899	1,100
	Hamilton, Wm. John (Interim)		Sci	1901	700
	Howard, Edwy S.	B.A., Vic.	Eng., Hist	1902	1,000
Perth	Hardie, William	B.A., Tor	Class	1892	1,200
	Edmiston, James Alfred			1893	850
	Rosevear, Howard Stanley	B.A., Tor., A.M., Harv.	Sci	1898	950
	McKim, William Andrew.	B.A., Tor	Eng., Hist., Fr., Ger	1900	800
	Doxsee, William Morley	B.A., Vic	Math	1899	900
Peterborough	Fessenden, Cortez	M.A., Trin	Math	1890	2,000
	Fife, James A	B.A., Tor	Math., Sci	1887	1,200
	Jeffries, John	B.A., Tor	Eng., Hist., Fr., Ger	1890	1,200
	Kenner, Henry R. H	B.A., Tor	Class	1893	1,200
	McPherson, Angus William	B.A., Tor		1899	800
	Fife, Mary H. A (Interim)	B.A., Tor.		1899	650
Ridgetown	Little, John George	B.A., Tor	Math	1889	1,300
	Reid, Robert	B.A., Tor	Eng., Hist., Fr., Ger	1895	850
	Marshall, John Wells (Interim)	B.A., Queen's	Class	1899	750
	Keillor, James	B.A., Queen's	Eng., Hist., (Interim)	1892	700
	Liebner, Ernest Oscar	B.A., Queen's	Sci	1901	850
St. Catharines	Henderson, John	M.A., Tor	Class., Eng., Hist.	1872	1,600
	Robertson, William John	B.A., Tor., LL.B., Vic	Math	1874	1,200
	Gilfin, James A	B.A., LL.B., Tor	Sci	1892	1,100
	Cloney, Sarah Louisa	M.A., Queen's	Eng., Hist , Fr., Ger	1896	900
	Laing, Arthur Stewart		Commercial	1898	900

4. List of Principals and Assistants of Collegiate Institutes and High Schools, January, 1902.—*Continued.*

Collegiate Institutes.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
St. Catharines.—*Con.*	Stevenson, William John			1894	$ 700
	Caverhill, Arthur E			1892	750
St. Mary's	Martin, Stephen	B.A., Tor.	Math	1886	1,200
	Follick, Thomas Henry	M.A., Vic.	Sci	1885	900
	Clayton, Adelaide Helena R.	B.A., Tor.	Eng., Hist., Fr., Ger	1892	850
	Glassey, David Alex	B.A., Tor.	Class	1894	900
	Morrison, William (Interim)	B.A., Tor.	Class	1901	550
St. Thomas	Quance, Noah	B.A., Tor.	Class	1891	1,500
	Stevenson, Orlando John	M.A., Tor.	Eng., Hist., Fr., Ger	1897	1,200
	Marty, Aletta Elise	M.A., Queen's	Fr., Ger	1894	1,200
	Lees, Richard	M.A., Queen's	Sci	1894	1,200
	Johnson, Robert Wilbur		Commercial (Interim)	1898	850
	Anglin, Robert W.	M.A., Qucon's	Math	1901	1,000
	Whitely, Lester R. (Interim)	B.A., Tor.	Eng., His., Fr., Ger	1901	600
	Simpson, Robert S		Commercial	1901	600
Sarnia	Grant, David M.	B.A., Tor.	Class	1885	1,400
	Corbett, Louis C	B.A., Tor.	Eng., Hist., Fr., Ger	1891	1,100
	Corkhill, Edward James	B.A., Queen's	Sci	1891	1,000
	Campbell, Alexander	B.A., Tor.	Math	1890	1,000
	Pottinger, Sylvia V			1875	750
Seaforth	Rogers, George F.	B.A., Vic.	Sci	1901	1,200
	Kirkwood, Florence Ethel (Interim)	B.A., Tor.	Class	1901	800
	Brown, Harry William	B.A., Tor.	Eng., Hist., Fr., Ger	1901	900
	Colling, George Featherston	B.A., Tor.	Math	1901	800
	Scratch, Linnie May		Commercial (Interim), Sci	1901	750
Stratford	Mayberry, Charles Alexander	B.A., LL.B, Tor.	Class	1890	1,550
	Robertson, Hugh S	B.A., Tor.	Math	1900	1,100
	Lennox, Thomas H.	B.A., Tor.	Sci	1900	1,000
	Stevenson, Andrew	B.A., Tor.	Eng., Hist	1901	1,000
	Malcolm, George	B.A., Queen's		1890	950
	Jackman, David S. (Interim)	M.A, Tor	Sci	1901	800
	Marty, Sophie E	M.A., Queen's	Eng., His., Fr., Ger	1899	1,000
	McGuirl, Thomas H.	B.A., Queen's		1901	700
Strathroy	Wetherell, James Elgin	B.A., Tor.	Class., Eng., Hist	1884	1,500
	Auld, Charles	B.A., Tor.	Math	1900	900
	Cook, Margaret	M.A., Tor	Eng', Hist., Fr., Ger	1895	850
	Conn, Henry	B.A., Tor.	Sci	1900	900
	Kent, Eleanor		Commercial	1899	750
Toronto (Harbord st.)	Spotton, Henry Byron	M.A., Tor	Class., Sci	1891	2,700
	Hagarty, Edward William	B.A., Tor.	Class	1891	1,700
	Balmer, Eliza May	B.A., Tor.	Eng., Hist., Fr., Ger	1891	1,700

	Lawler, Gertrude	M.A., Tor	Eng., Hist., Fr., Ger., Math	1891	1,700
	Smyth, Thomas Henry	M.A., Tor	Sci	1891	1,700
	Cox, John Loane	B.A., Tor	Math	1892	1,700
	Eldon, Robert Henry	B.A., Queen's	Math., Commercial	1891	1,700
	Forfar, Charles	B.A., Tor	Eng., Hist., Fr., Ger	1892	1,400
	Kennedy, Lyman Aaron	M.A., Vic		1892	1,400
	Strath, Robert Smith	B.A., Tor		1893	1,400
	Clark, Luther J	B.A., Queen's		1896	1,250
	Carstairs, John Stewart	B.A., Tor	Eng., Hist	1899	1,200
Toronto (Jameson ave.)	Embree, Luther Edmund	M.A., Tor	Class., Eng., Hist., Fr., Gr	1888	2,700
	Smith, Gilbert Acheson	B.A., Tor	Sci	1889	1,700
	Hillock, Julia S	B.A., Tor	Fr., Ger	1900	1,450
	Birchard, Isaac J	M.A., Tor	Math	1893	1,700
	Crawford, Henry J	B.A., Tor	Class	1894	1,700
	Millar, James			1888	1,700
	Spence, Nellie	B.A., Tor	Class., Eng., Hist	1889	1,500
	Sinclair, John	B.A., Tor		1898	1,250
	Black, James S		Commercial	1902	1,200
Toronto (Jarvis st.)	Manley, Frederick Fitzpayne	M.A., Tor	Math	1875	2,600
	Chase, George A	B.A., Tor	Eng., Hist., Fr., Ger	1889	1,600
	Gray, Robert A	B.A., Tor	Math	1900	1,500
	Shaw, George Edmund	B.A., Tor	Eng., Hist., Fr., Ger	1876	1,600
	Grant, Wilbur		Math	1881	1,600
	Michell, William C	B.A., Tor	Class	1897	1,500
	Gundy, Henry Wentworth (Interim)	B.A., Tor	Class	1900	1,100
	Lehmann, Carl	B.A., Tor	Science (Interim)	1898	1,500
	Thomas, Janie	B.A., Tor	Eng., Hist	1882	1,200
	O'Rourke, Mary (Interim)	B.A., Tor	Math	1900	1,000
Whitby	Hogarth, George Henry	B.A., Tor	Math	1899	1,100
	Thompson, Peter M (Interim)	M.A., Queen's	Sci	1900	750
	Black, Harvey H (Interim)	M.A., Queen's	Class	1900	700
	Walks, Robert Hilton	B.A., Tor	Eng., Hist. (Interim)	1900	750
	Umphrey, George Wallace (Interim)	B.A., Tor., M.A., Harvard	Fr., Ger	1901	700
Windsor	Cody William Stephen	B.A., Tor	Math	1893	1,600
	Gavin, Frederick P	B.A., Queen's	Sci	1892	1,200
	Bell, Frederick Henry	B.A., Tor	Eng, Hist., Fr., Ger	1898	900
	McVicar, Archibald	B.A., Tor	Eng., Hist	1898	900
	Messmore, James Franklin	B.A., Tor	Class	1899	900
	Neilson, James		Commercial	1898	900
	Cleary, Norah (Interim)	B.A., Tor		1900	700
Woodstock	Levan, Isaac Master	B.A., Tor	Class., Eng., Hist., Fr., Ger	1898	1,500
	Griffin, Albert Dyke	B.A., Queen's	Math	1882	1,200
	Kerr, Charles Staple	B.A., Tor	Eng., Hist. (Interim) Class	1889	1,100
	Cole, James McLarty		Sci	1898	1,000
	Srigley, Edward Cooper		Commercial	1895	850
	Ashwell, Annie Eliza	B.A., Tor	Eng., Hist., Fr., Ger	1901	800
	Watson, Ervin Herbert Alf. (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1901	600
High Schools.					
Alexandria	MacKay, Donald	B.A., Tor	Class	1895	1,250
	Longmore, Howard Bruce	B.A., Queen's		1898	800
	O'Brien, Lizzie			1896	700

4. List of Principals and Assistants of Collegiate Institutes and High Schools, January, 1902.—*Continued.*

High Schools.	Names of Teachers.	Degree.	Specialists.	Date of appointment.	Salary.
Almonte	Tasker, Lawrence Hermon	M.A., LL.B., Tor	Class	1901	1,050
	McPhail, Alexander C	B.A., Queen's		1899	750
	Armour, Amy A		Fr., Ger. (Interim)	1893	800
	Thompson, Margaret Jane	B.A., Queen's	Fr., Ger. (Interim) Eng., Hist	1895	800
Arnprior	Morrow, Archibald Elston	B.A., Tor	Class	1898	1,100
	Rudlen, George William	B.A., Tor	Math	1898	750
	Mitchell, Jessie Ann	B.A., Tor		1902	600
Arthur	Snider, Egerton E	B.A., Vic	Math	1896	1,050
	Elder, William John (Interim)	B.A., Tor	Class	1899	600
	Elmslie, Wallace (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1901	500
Athens	Massey, Norman Levi	B.A., Vic	Math	1898	950
	Bishop, Charles Peter	B.A., Queen's		1895	725
	Dowsley, William Clinton	M.A., Queen's	Class., Hist., Eng	1899	725
	Anderson, Frank Cecil (Interim)	B.A., Queen's	Sci	1901	600
Aurora	Mulloy, Charles W	B.A., Tor	Class	1896	1,000
	Rice, John			1895	650
	Trenaman, Mabel (Interim)	B.A., Tor	Eng., Hist, Fr., Ger	1902	400
Beamsville	Myer, Albert Nicholas	M.A., Trin	Math	1898	800
	Ball, Kathleen Hester			1892	550
Belleville	Milburn, Edward Fairfax	B.A., Trin		1893	1,200
	Knight, William W		Math	1892	900
	Clarke, Henry Jellyman		Sci	1892	900
	McRae, Jesse Carre			1889	625
	Luton, James T	M.A., Tor	Class	1898	900
Berlin	Forsyth, David	B.A., Tor	Math	1901	1,200
	Connor, James William	B.A., Tor	Class., Eng., Hist	1901	1,200
	Sheppard, Frederick William		Eng., Hist	1888	900
	Weidenhammer, William B	B.A., Tor	Eng., Hist., Fr., Ger	1901	800
Bowmanville	Gilfillan, James	B.A., Queen's	Sci	1880	1,200
	Tamblyn, William Ware	M.A., Tor	Class., Eng., Hist., Fr, Ger	1897	900
	Frost, Francis Henry	B.A., Tor	Math	1896	900
	Bragg, Thomas George	B.A., Tor	Class., Fr., Ger	1897	800
Bradford	Foucar, Walter K	B.A., Tor	Fr., Ger., (Interin.) Eng., Hist	1901	850
	McLean, Allan			1892	700
	Brown, Duncan A (Interim)			1900	450
Brampton	Fenton, William J	B.A., Tor	Class	1894	1,200
	Galbraith, William John	B.A., Trin	Fr., Ger	1887	900
	Shields, Alexander M	B.A., Tor	Eng., Hist	1902	800
	Warren, James M	B.A., Tor	Math	1897	900
	Cosens, Absalom	B.A., Tor	Sci	1897	850

Brighton	Newman, George E	B.A., Queen's	Fr. Gr., (Interim) Eng., Hist	1896	900
	Burke, Alexander			1894	700
Caledonia	Seaton, Edward T	B.A., Queen's	Math	1901	850
	Dobson, Percy Charles (Interim)	B.A., Tor	Class	1901	600
	Barr, Janet	B.A., Queen's		1901	500
Campbellford	Hume, John P	B.A., Queen's		1896	900
	Boyes, Robert		Math	1895	800
	Kingston, George A (Interim)	B.A., Tor		1901	600
Carleton Place	Standing, Thomas W	B.A., Tor	Math	1901	1,000
	Asselstine, Robert W (Interim)	B.A., Queen's		1901	600
	McDonald, Neil			1890	700
	Macdonald, John F (Interim)	M.A., Queen's	Class	1901	800
Cayuga	Skeele, James Eton	B.A., Tor		1897	950
	French, Bruce (Interim)	B.A., Tor		1899	600
	Healey, Robert Wesley (Interim)	B.A., Tor	Math	1901	600
Colborne	Bellamy, Wesley	B.A., Vic		1890	925
	Kemp, William (Interim)	M.A., Queen's	Eng., Hist., Fr., Ger	1901	600
Cornwall	MacLean, Allan Edmund	B.A., Queen's	Fr., Ger., (Interim)	1898	1,100
	Nugent, James			1884	950
	Fitzgerald, Eliza Sophia	M.A., Queen's	Class	1899	1,000
	Birchard, Alexander Fraser			1898	700
	Crewson, Joseph W	B.A., Vic		1902	900
Deseronto	Smellie, W. K. T	B.A., Tor	Sci	1896	1,150
	Whyte, Robert	B.A., Tor		1896	800
	Newcombe, Abram C (Interim)	B.A., McMaster	Class	1901	600
Dundas	Meiklejohn, Allan J	B.A., Queen's	Eng., Hist	1901	1,100
	Wren, John Stuart (Interim)	B.A., Tor	Math	1901	800
	Panton, Agnes Wilkie			1892	550
Dunnville	Cooke, John A	B.A., Queen's	Class	1896	900
	Waines, William Leslie	B.A., Trin	Class., (Interim)	1899	725
	Robertson, George D			1893	650
	Hills, Minnie (Interim)	B.A., Tor	Math	1901	550
Dutton	Taylor, John Andrew	B.A., Queen's	Sci	1898	850
	McDougall, Duncan (Interim)	B.A., Tor	Class	1901	600
	Matheson, John	M.A., Queen's		1901	550
	Taylor, Emma Jean (Interim)	B.A., Tor		1901	400
Elora	MacMurchy, Norman	B.A., Tor	Sci	1895	1,000
	Shaw, Robert (Interim)			1901	600
	Alexander, Helen Bow (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1901	550
Essex	Crossweller, Christopher L	B.A., Tor	Math	1888	1,150
	Teskey, Edith A	M.A., Tor	Class	1901	650
	Smith, Arthur (Interim)	B.A., Tor	Sci	1901	600
Fergus	Perry, Peter	M.A., Trin	Class	1889	1,000
	Campbell, Archibald L			1894	750
	Macdonald, Jessie E (Interim)	B.A., Tor		1901	450
Forest	Preston, Thomas	B.A., Tor	Sci., (Interim)	1897	875
	Tennant, Adelaide Emma	B.A., Tor	Eng., Hist., Fr., Ger	1898	625
	McKinley, James Mathew (Interim)	B.A., Tor	Class	1901	625
Fort William	Pilkey, Peter Joseph	B.A., Queen's		1901	1,000
	Mathews, Stanley Wade	M.A., Queen's	Math	1899	800
Gananoque	Graham, Robert George	B.A., Vic	Math	1894	1,100

4. List of Principals and Assistants of Collegiate Institutes and High Schools, January, 1902.—*Continued.*

High Schools.	Names of Teachers.	Degree.	Specialists	Date of appointment.	Salary.
Gananoque	McPherson, Walter E	B.A., Tor.; LL.B., Queen's	Eng., Hist., Fr., Ger	1897	$ 850
	Wilson, W. Ashbury	B.A., Queen's		1899	600
Georgetown	Coutts. Richard David	B.A., Tor	Class	1897	1,000
	Wetherald, Hubert M			1897	700
	Watterworth, Grace M. (Interim)		Commercial	1900	500
Glencoe	Morrow, John Duncanson	B.A., Tor	Class	1898	850
	Taylor, John Gladstone	B.A., Tor	Math	1900	650
	Allin, Elizabeth A	B.A., Tor	Fr., Gr.	1899	550
	Harrison, E. Gertrude (Interim)			1900	400
Gravenhurst	Muldrew, William H	B.A., Queen's; D. Pæd., Tor.	Math., Sci	1894	1,000
	Downey, Helen E (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1900	500
Grimsby	Harrison, Charles W	M.A., Vic		1894	800
	Strang, Rose Innis			1901	500
Hagersville	Jones, George M	B.A., Tor	Eng., Hist., Fr., Gr	1900	900
	Kaiser, Jesse B			1891	750
	Wright, Robert			1896	600
Harriston	Maclean, Godwin V	B.A., Tor.; M.A., Harvard	Math	1901	1,000
	Munro, Peter Fraser (Interim)	B.A., Queen's	Class	1901	650
	Nichols, Bessie Hockings	B.A., Tor	Eng., Hist., Fr., Gr	1900	525
Hawkesbury	Rogers, James C	B.A., Queen's	Eng., Hist, Fr., Ger	1901	1,000
	Wright, William George			1896	700
	Higginson, Maria Adelaide			1897	600
Iroquois	Stanley, Thomas E. A	B.A., Tor	Math	1897	1,000
	Anderson, William G (Interim)	B.A., Tor	Class	1901	700
	Smeaton, William (Interim)	B.A., Tor	Sci	1900	750
	Rose, Marion H		Fr., Ger	1898	600
Kemptville	Dillane, William	B.A., Tor		1895	1,100
	Nelson, John	B.A., Queen's	Math	1896	800
	Moore, James R	M.A., Queen's	Sci	1901	800
	Macdougall, Graham (Interim)	B.A., Tor	Class	1901	600
Kincardine	Perry, Samuel Walter	B.A., Vic.	Class	1890	1,200
	Gray, James	M.A., Tor		1890	700
	Norris, James	M.A., Queen's	Math	1894	900
	Bale, George Sidney (Interim)	B.A., Tor	Eng., Hist., Fr., Gr	1901	600
Leamington	Elliott, John	B.A., Queen's	Eng., Hist., Math	1896	1,100
	Bonis, Harry	B.A., Tor	Class	1899	775
	Robertson, Alexander Morton	M.A., Queen's	Math., Fr., Ger	1900	700
	Keith, Arthur W (Interim)	B.A., Tor	Sci	1901	550
Listowel	Phillips, William Alexander	B.A., Tor	Eng., Hist., Fr., Gr	1892	1,025
	Nichol, William Wallace	B.A., Tor	Math	1898	750
	Stoddart, Robert	B.A., Tor	Class	1898	675

Lucan	Stuart, Frederick Alfred	B.A., Tor	Sci	1897	1,000
	Tier, William	M.A., Tor	Math	1896	750
	Carter, Elsie (Interim)	B.A., Tor		1900	600
	Stewart, William Henry (Interim)			1899	500
Madoc	Watson, Alexander H	B.A., Tor		1889	1,100
	Ivey, Thomas J	M.A., Tor	Sci	1896	750
	Cathro, Elizabeth D			1901	400
Markham	Reed, George Henry	B.A., B. Pæd., Tor	Class	1890	1,000
	Merritt, Robert Norris (Interim)	B.A., Tor	Math	1901	650
	Annis, Mary A	B.A., Tor	Fr., Ger. (Interim)	1895	525
	Miller, Nannie M. A		Eng, Hist	1894	475
	McKay, Donald A (Interim)	B.A., Queen's	Sci	1901	475
Meaford	Cornwell, John Leslie	B.A., Tor	Math	1900	1,000
	Huff, Samuel		Sci	1891	750
	Dundas, Arthur A	B.A., Tor		1897	700
	Dingle, Grace Kean	B.A., Tor	Eng., Hist., Fr., Ger	1900	650
Mitchell	Elliott, William	B.A., Tor	Math	1882	1,050
	Sprott, Robert J (Interim)	B.A., Tor	Eng., Hist, Fr., Ger	1902	800
	May, William F			1895	750
Mount Forest	Brethour, John Henry	B.A., Vic	Class	1891	1,100
	Pearson, Alexander	B.A., Tor	Sci. (Interim)	1895	750
	Keith, George Walter	B.A., Tor	Math	1901	700
	Clapp, Florence Hamilton			1900	325
Newburgh	Nesbit, David Ashton	B.A., Queen's		1893	1,000
	Brown, Percy W		Sci	1898	600
	Denyes, James Malcolm	B.A., Queen's	Fr., Ger. (Interim)	1898	600
Newcastle	Davidson, Hugh	B.A., Tor		1888	850
	Grose, Caroline (Interim)			1901	400
Newmarket	Coombs, Ernest	M A., B. Pæd., Tor	Class	1899	1,000
	Hollingshead, John Edwin			1884	725
	Carefoot, George A		Sci	1901	600
Niagara	Barron, Robert Armour	B.A., Tor	Class., Eng., Hist., Fr., Ger	1900	800
	Blaine, Maude Elizabeth (Interim)			1900	450
Niagara Falls South	Gibbard, Alexander H	B.A., Tor	Eng., Hist, Fr., Ger	1901	900
	Wood, Elmore E (Interim)	B.A., McMaster	Math	1901	575
	Morrison, Amy M (Interim)	B.A., Tor		1901	450
Norwood	Davidson, John	M.A., LL.B., Vic	Class	1882	1,100
	Graham, Peter Edwin	B.A., Queen's	Fr., Gr	1899	650
	Closs, Frank D		Sci	1901	550
Oakville	Wellwood, Nesbitt John	B.A., Tor	Math	1877	1,050
	Sheridan, William John (Interim)			1902	600
Omemee	Jardine, William Wilson	B.A., Tor		1898	860
	Morgan, John James	B.A., Vic	Sci	1896	650
Orangeville	Steele, Alexander	B.A., Tor	Eng, Hist,, Math	1879	1,400
	Clarke, Frederick Hall	B.A., Tor	Fr., Ger. (Interim) Eng. Hist	1895	800
	Dunkley, Albert Wesley (Interim)	M.A., Queen's	Class	1901	700
	McDonald, Wilbert L (Interim)			1901	450
	Smith, Herbert Hamilton (Interim)	B.A., Tor	Sci	1901	600
Oshawa	Smith, Lyman C	B.A., Vic	Class., Eng., Hist	1882	1,300
	Slemon, Edward T	B.A., Vic	Math	1892	1,000
	Panton, Jessie R			1886	650

4 —List of Principals and Assistants of Collegiate Institutes and High Schools, January, 1902.—*Continued.*

High Schools.	Names of teachers.	Degree.	Specialists.	Date of appointment.	Salary.
					$
Oshawa.—*Con*	Graham, Louis Hartley ... (Interim)	M.A., Tor	Sci	1901	650
Paris	Bell, Walter N	B.A., Tor	Class	1898	1,200
	Wightman, Robert	B.A., Tor	Math	1900	700
	Rush, Myron Leslie .....(Interim)	B.A., Tor	Sci	1901	700
Parkhill	McDougall, Neil	B.A., Tor	Sci. (Interim)	1896	825
	Libby, Minnie Fennessy	B.A., Vic	Fr., Ger. (Interim) Eng. Hist	1895	625
	Guest, Emily J .....(Interim)	M.A., Tor		1901	500
Pembroke	Ross, Ralph	B A , Tor	Class	1895	1,200
	White, Edwin Theodore ....(Interim)	B.A., Tor	Math	1901	800
	Saunders, William John . .(Interim)	M.A., Queen's	Sci	1900	700
	Millar, Margaret Garvin....(Interim)	B.A., Tor		1900	600
Petrolea	Bell, John Johnstone	B.A., Tor		1888	1,200
	Clyde, William	M.A., Queen's		1888	1,050
	Balls, George Herbert	B.A., Tor	Math (Interim)	1901	700
	Donaldson, William	B.A., Tor		1901	700
Picton	Dobson, Robert	B.A., Vic	Math	1880	1,200
	Morden, Gilbert Walworth	B.A., Queen's	Sci	1895	1,000
	Hendrick, Archer W	B.A., Tor		1897	1,000
	Reynar, Marianne Beatrice..(Interim)	B.A., Vic	Eng., Hist., Fr., Ger	1901	750
	Dolan, John Henry	B.A., Queen's	Class	1899	900
Port Arthur	McCulloch, Andrew	M.A., Queen's		1895	1,200
	Morgan, James William		Eng. Hist	1890	1,000
Port Dover	Liddy, William R	B.A., Tor	Sci	1899	800
	Martin, John Strickler	B.A., Tor		1899	600
Port Elgin	Lillie, John Turner	B.A., Vic	Class	1889	1,100
	Innis, Alexander R			1892	750
	Wilson, Nathan Lamont ....(Interim)	B.A., Tor	Class	1901	500
Port Hope	Kirkconnell, Thomas A	B.A., Queen's	Math	1888	1,200
	Caesar, Lawson	B.A., Tor	Class	1900	900
	Weir, Annie	B.A., Tor	Eng., Hist., Fr., Ger	1897	800
	Emery, John W		Sci	1900	850
	Moir, Catharine Elizabeth			1896	600
Port Perry	McBride, Dugald	B.A., Vic	Class, Math	1871	1,300
	Stone, George			1883	850
	MacArthur, Christina M			1895	600
	Johnstone, Lily ... .(Interim)		Commercial	1901	500
Port Rowan	Pugsley, Edmund	B.A., Vic	Sci	1896	850
	Lewis, Jessie Morgan		Fr., Ger	1899	400
Prescott	Rose, Robert Charles	B.A., Tor	Math	1896	1,080
	McPherson, Hattie Georgina (Interim)	B.A., Queen's	Eng., Hist., Fr., Ger	1900	550

	Korfoot, Horace W .....(Interim)	B.A., Queen's	.....	1901	550
Rat Portage.....	Roberts, Thomas Henry ....(Interim)	B.A., Tor	.....	1902	1,000
	Poole, Franklin C ... .(Interim)	.....	.....	1902	800
Renfrew	McDowell, Charles	B.A., Queen's	Math	1879	1,100
	Dolan, George.....(Interim)	B.A., Queen's	Class, Eng., Hist.....	1901	700
	Ewing, William Campbell.....	M.A., Queen's.....	Sci.....	1896	725
	Davidson, Jean .....(Interim)	.....	.....	1899	500
	Moore, Elizabeth Greenwood (Interim)	B.A., Tor	Eng. Hist., Fr., Ger	1900	425
Richmond Hill	Farquharson, Robert Andrew.....	B.A., Queen's	Eng., Hist., Fr., Ger.....	1899	900
	Glass, William Arthur .....(Interim)	B.A., Tor.....	.....	1901	600
Simcoe	Christie, James Douglas	B.A., Tor.....	Eng. Hist., Fr., Ger.....	1889	1,300
	Power, John Francis	M.A., Queen's.....	Sci	1897	900
	Galbraith, Robert	B.A., Queen's	Math	1899	850
	Thompson, John Fletcher	B.A., Tor.....	Class.....	1899	750
Smith's Falls..... ...	Houston, John Arthur.....	M.A., Trin	Math.....	1887	1,200
	Stubbs, Samuel J	B.A., Tor.	Eng., Hist., Class.....	1897	800
	Morgan, Joseph	B.A., Queen's	Sci., (Interim).....	1900	700
	Pitcher, Winona Jessie.....(Interim)	B.A., McGill.....	.....	1901	500
Smithville....	Tremeer, James.....	B.A., Vic	Class.....	1898	950
	Bridgman, Clara M.....	.....	.....	1899	400
	Williams, Albert..... .....(Interim)	.....	.....	1902	415
Stirling	Kennedy, George E	B. A. Vic	Sci	1893	900
	Rutherford, Walter R.....	M.A., Tor	Class., Eng., Hist., Fr., Gr	1899	750
Streetsville	Cameron, Aldis W	B.A., Tor.....	Eng., Hist	1898	800
	Forbes, William B.... .....(Interim)	.....	Sci.....	1901	650
Sydenham	Breuls, Ira D.....	B.A., Queen's.....	Sci.....	1900	1,000
	Harvey, William Blakely.....	.....	.....	1889	800
	Henstridge, Elizabeth.....(Interim)	M.A. Queen's	Eng., Hist., Fr., Gr	1901	450
Thorold	Bald, William Francis	B.A., LL.B., Tor	Class.....	1898	1,000
	Smith, Margaret T. Hübner.....	.....	.....	1898	600
	Kennedy, Thomas .....(Interim)	M.A., Queen's	Math	1900	600
Tilsonburg	Ross, Alexander H. D.	M.A., Queen's	Sci., Math	1896	1,000
	McLennan, Alexander L....(Interim)	B.A., Queen's	.....	1900	700
	Wyatt, Malcolm.....(Interim)	.....	.....	1902	550
Toronto Junction.	Colbeck, Franklin Charles	B.A., Vic.	Class., Eng., Hist	1894	1,500
	Gourlay, Richard.....	B.A., Tor.....	Class., Math	1893	1,100
	Charles, Henrietta	B.A., Tor.....	Eng., Hist., Fr., Ger	1900	1,050
	Chrysler, Minton A.....	B.A., Tor.....	Sci	1895	1,050
	Page, Ralph Barlow	M.A., Tor	Eng., Hist., Fr., Ger	1898	700
Trenton	Ingall, Elmer Ellsworth	B.A., Tor.....	.....	1895	1,025
	Longman, Edwin	....	Math	1892	750
	Pattee, Ada.....	.....	Eng., Hist	1889	725
Uxbridge	Park, Henry George.....	B.A., B.Paed., Tor.....	Class.....	1888	1,000
	Sifton, Joseph Wright .... (Interim)	B.A., Tor.....	Math	1900	700
	Barr, Lydia A	....	.....	1891	500
	Buchanan, John Alex.....(Interim)	.....	.....	1901	500
Vankleek Hill.....	Jamieson, Thomas	B.A , Vic	Math	1889	1,000
	Clothier, James O.....	B.A., Queen's	Fr., Ger. (Interim)	1895	700
	Wilson, Thomas M	B.A., Tor.....	Sci.....	1901	700
	McLean. Walter Inglis.....(Interim)	B.A., Tor	Class.....	1900	600
Vienna.....	Bigg, Edmund M.....	M.A., Tor.....	Sci.....	1901	750

4.—List of Principals and Assistants of Collegiate Institutes and High Schools, January, 1902.—*Concluded.*

High Schools.	Names of teacher.	Degree.	Specialists.	Date of appointment.	Salary.
					$
Vienna.—*Con.*	Morrison, E. Selkirk (Interim)	B.A., Queen's	Eng., Hist	1902	450
Walkerton	Morgan, Joseph	M.A., Tor	Class	1881	1,200
	Witton, James Gayford	B.A., Tor	Math	1896	1,000
	Day, Alfred Ernest	M.A., Queen's	Eng., Hist., Fr., Ger	1901	800
	Cheswright, Richard C		Sci	1900	800
Wardsville	Elliott, Thomas E	B.A., Tor	Eng., Hist., Fr., Ger	1901	800
	Smith, Mabel A (Interim)	B.A., Tor		1901	450
Waterdown	Freeman, John Alexander	B.A., Tor	Class	1893	950
	Gunn, Daniel Wesley (Interim)	B.A., McMaster	Math	1901	500
	Aitchison, Belle			1897	400
Waterford	Mills, John Hudson	M.A., Queen's	Class	1899	1,000
	Saunders, William R (Interim)	B.A., Queen's		1900	600
	Gould, Ethel W (Interim)	B.A., Tor		1900	500
Watford	Potter, Charles	B.A., Tor	Math	1892	1,000
	Race, Wilfrid Ballentine			1893	750
	Williams, Lorne Joseph			1898	500
	Bambridge, Celia (Interim)			1900	425
Welland	McCuaig, Herbert M	B.A., Queen's		1891	1,100
	McNiece, James	B.A., Tor	Sci	1896	800
	Foster, Jessie		Fr., Ger. (Interim)	1899	500
	Buchner, Claribel (Interim)			1901	500
Weston	Forbes, John W	B.A., Tor	Math	1901	800
	Hawkins, Maud Mary (Interim)	B.A., Tor	Fr., Ger	1901	400
	Tennant, Isabella Leathem (Interim)	B.A., Tor	Eng., Hist., Fr., Ger	1901	400
Wiarton	Snell, Joseph A	M.A., Queen's	Math	1895	1,050
	Baines, Archibald W	B.A., Trin		1895	700
	Jermyn, Percy Thomas (Interim)	B.A., Tor		1901	600
Williamstown	MacDonald, James	M.A., Queen's	Class	1898	1,100
	Witheril, Ebenezer Rufus	B.A., Queen's		1895	800
	Millar, Frederick Gourlay (Interim)	B.A., Tor		1900	600

Recapitulation.

Number of Schools. Sex of Teachers,		Number of Teachers.		Salaries.		Universities, etc., of Teachers.	
		Collegiate Institutes.		*Collegiate Institutes.*		*Collegiate Institutes and High Schools.*	
Collegiate Institutes	38	Principals	38	Highest salary	$2,700	Toronto	300
High Schools	94	Assistants	234	Average " Principals	1,572	Victoria	37
	132	Total	272	" " Assistants	1,003	Queen's	101
				Average salary	$1,083	Trinity	12
						McGill	2
						McMaster	6
						British	2
						American	3
						Interim Certs	108
						Specialists	350
						Interim Specialists	92
						D. Paed	2
						B. Paed	3
						Graduates	456
						Non-Graduates	123
		High Schools.		*High Schools.*			
		Principals	94	Highest salary	$1,500		
		Assistants	213	Average " Principals	1,028		
Teachers.		Total	307	" " Assistants	671		
Gentlemen	474			Average salary	$780		
Ladies	105						
Total	579						
		Grand Total.		*Summary.*			
		Principals	132	Highest salary	$2,700		
		Assistants	447	Average " Principals	1,184		
		Grand total	579	" " Assistants	844		
				Average salary	$922		

ANNUAL

ARCHÆOLOGICAL REPORT

1901.

BEING PART OF

APPENDIX

TO THE REPORT OF THE

MINISTER OF EDUCATION

ONTARIO.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY

TORONTO:
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1902.

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CONTENTS.

	PAGE.
Presentation	1
Accessions to the Museum	3
Notes	18
Ossuary in Clinton Township, Lincoln County	22
The Yellow Point Mound	25
Mounds Generally	30
Earthwork in Township of Moore	32
Supposed Aboriginal Fish Weir near Drumbo—W. J. Wintemberg	35
Indian Occupation in Nissouri—L. D. Brown	38
Animal Remains on Indian Village Sites—Dr. Wm. Brodie	44
Wampum Records of the Ottawas—A. F. Hunter, M.A	52
Notes on Huron Villages in Medonte, Simcoe County—A. F. Hunter, M.A	56
Notes on North Victoria Village Sites—Lieut. G. E. Laidlaw	100
Notes on Canadian Pottery—F. W Waugh	108
On the Paganism of the Iroquois of Ontario—David Boyle	115
The Philosophy of Folk-lore—David Boyle	125
Some Ethnological Observations in South Africa—Lieut. G. E. Laidlaw	132

Hon. Richard Harcourt, M.A., K.C.,

Minister of Education.

Sir,—Herewith is presented the Archaeological Report for the year 1901.

The period that has elapsed since the presentation of our last statement has been a very busy one, and once more it is to be regretted that so little has been possible in the way of outside work.

A good deal of time had to be given to the exhibit of archaeological material shown at the Pan-American Exposition. This exhibit, although made without any competitive motive, was awarded the silver medal.

The number of specimens added to the museum during the past twelve months is not so large as I have frequently had to report, but in point of value the new material exceeds that of several former years.

Intelligent interest in archaeological and ethnological study is manifestly growing, if one may form an opinion from the large increase in correspondence, as well as from the number of visitors who come to the museum, not simply to pass through, but to spend considerable time in examining the contents of our cases.

I have the honor
to be yours respectfully,

DAVID BOYLE.

Toronto, Dec. 31, 1901.

22,130 Clay pot (imperfect), found under a rocky cliff on Muskoka Bay, near Severn Portage. Mr. T. M. Robinson, Gravenhurst.
22,131 Wooden pipe, made by the M'kosa Kaffirs, Cape Colony. Frederick Hamilton, M.A., Toronto.
22,132 Large steel snow knife, Eskimo, Mackenzie River district.
22,133 Hunting knife with ivory handle, finely finished blade, Mackenzie River district.
22,134-35 Two boring instruments with three drills, Eskimo, Mackenzie River district.
22,136-37 Two sledge toggles and lines.
22,138-40 Three tobacco pipes, mouth of Mackenzie River.
22,141 Crooked knife, ivory handle, found at mouth of Mackenzie River.
22,142 Short knife, carved handle.
22,143 Crooked knife, horn handle.
22,144 Woman's large knife, Eskimo.
22,145 Woman's small knife, Eskimo.
22,146 Spoon, fossil ivory, Eskimo.
22,147-52 Herring hooks, Eskimo.
22,153-58 Ivory fish hooks, Eskimo.
22,159-65 Bone fish hooks, Eskimo.
22,166 Small bear's head, used as charm on fishing boats, Eskimo.
22,167 Bone netting needle, Eskimo.
22,168-79 Bow and eleven arrows, with tightening pieces, Eskimo.
22,180 Small model of kayak, Eskimo.
22,181 Woman's shoes of seal and grampus skin, Eskimo.
22,182 Men's boots of deer and grampus skin.
22,183 Pair of woman's ear-rings, Eskimo.
22,184 Pair of men's stone labrets, Eskimo.
22,185 Woman's labrets (obsolete), Eskimo.
22,186 Man's labret, worn by well-to-do natives, Eskimo.
22,187 Model spear toggle-joint (for seals), Eskimo.
22,188 Spear for white grampus, Eskimo.
22,189 Flint scraper, Eskimo.
22,190 Iron scraper, Eskimo.
22,191 Flint arrowhead, Eskimo.
22,192 Flint spear head, Eskimo.
22,193 Girl's fur dress, Eskimo.
22,194 Walrus' tusk, from natives west of Mackenzie River, Eskimo.
22,195 Dressed caribou skin. Loucheaux Indians.
22,196-99 (4) Pairs of Loucheaux snowshoes.
22,200 Pair of gloves, Eskimo.
22,201 Ivory harness toggle, Eskimo.
22,202 Bone needle-case, Eskimo.

From 22,132 to 22,202 were procured from the Rev. C. E. Whittaker, Episcopalian Missionary to the Eskimo and other natives in the Mackenzie River district.

22,203 Birch bark torch, as used in Mississauga sugar camps. F. W. Waugh.
22,204 Zulu eating dish. C'unquaaun. F. Hamilton, M.A.
22,205 Plain stone axe, degraded to hammer use. E. D. Windsor, Clarksburg.
22,206 Small stone axe, plain, perfect. E. D. Windsor.
22,207 Stone axe, plain, imperfect, but good. E. D. Windsor.
22,208 Stone axe, thin slate. E. D. Windsor.
22,209 Piece of worked quartzite. E. D. Windsor.
22,210 Clay pipe, short stem, a little broken. E. D. Windsor.
22,211 Cast of gorget (porphyritic), Danby Tp., Ionia Co., Mich. Found by Norman Fox. C. V. Fuller, Grand Ledge.
22,212 Cast. Near Delaware, Ohio. Found by G. L. Perryman, Lansing, Mich. C. V. Fuller.
22,213 Cast. Section 7, Walton Township, Eaton Co., Mich. Edward Stevens. C. V. Fuller.
22,214 Cast. Ionia County, Mich. C. V. Fuller.
22,215 Cast. Windsor Township, Eaton County, Mich.
22,216 Cast. Section 3, Oneida Tp., Eaton Co., Mich. C. V. Fuller.
22,217 Cast. Clinton County, Mich. C. V. Fuller.
22,218 Cast. Eaton County, Mich. C. V. Fuller.
22,219 Loucheaux model of sled laden with fish. Mackenzie River mission. Rev. C. E. Whittaker.
22,220 Small knife, Eskimo " " "
22,221-23 Fish hooks. " " "
22,222 Is a combination of coarse jadeite, bone and iron.
22,224 A small ivory charm in the form of a bear's head, ornamented with small centered circles and used for attachment to fishing kayaks. Rev. C. E. Whittaker.
22,225 Red argillite, perforated. Crocodile Valley, Transvaal, South Africa. Lieut. G. E. Laidlaw.
22,226 Soapstone, two holes partly bored. Lieut. G. E. Laidlaw, South Africa.
22,227 Fragments of pottery, Transvaal, South Africa. Lieut. G. E. Laidlaw, South Africa.
22,228 Stone pipe, north shore Lake Superior. Chief John Monague, Christian Island.
22,229-31 Three assagais, Pilgrim's Rest, Lydenburg Mts., Transvaal, South Africa. Lieut. G. E. Laidlaw.
22,232-33 Wooden pillows (as used by a people exterminated by the Zulus), Crocodile River Valley. Lieut. G. E. Laidlaw.
22,234. Water pail of leather (no donor, or locality known).
22,235-36 Two brass wire bracelets. From a Kaffir village about 8 miles north of Pretoria.
22,237 Copper wire bracelet. From a Kaffir village about 8 miles north of Pretoria.
22,238 Iron wire armlet. Transvaal Colony. Mr. W. J. Morrison.

22,239 Clay pot with incised spiral pattern on the outside. Miss Josephine Keller, Vicksburg, Mississippi.

22,240 Arrow head, lot 17, con. 8, Pickering, Ont. Edward Gibson, per Rev. W. Adams, Claremont, Ont.

22,241 Small stone axe, found near Lake Opinicon, Frontenac County. J. Walter Wells, Belleville.

22,242 Skull of Indian, found on lot 5, con. 8, Clinton Township, Lincoln County (about 2 feet below the surface). It is estimated that 250 bodies were interred here. S. H. Moyer, Campden.

22,243 Thigh-bone, united after fracture, lot 5, con. 8, Clinton. S. H. Moyer, Campden.

22,244-45 Thigh-bones from same place. S. H. Moyer.

22,246-52 Snake dance costume, as used by the Moquis of Arizona, including waist cloth and sash woven in colored patterns, turtle rattle with hoof bangles, pair of leather leg bands ornamented with feathers, skin, and small gourd rattle. Mr. A. T. Tye, M.E., per Miss Tye, 276 Jarvis street, Toronto.

22,253 Clay pipe, Tiny Township. A. F. Hunter, Barrie. (Imitation by boys.)

22,254 Bone awl or needle, Kamloops, British Columbia. W. C. Perry, Winnipeg.

22,255 Fragment of copper pyrites and copper-stained bone, village site, Kamloops, British Columbia. W. C. Perry, Winnipeg.

22,256 Small jade cutting tool. W. C. Perry, Winnipeg.

22,257 Photograph of Zulu man. Dr. T. W. Beeman, Perth.

22,258 Photograph of two Zulu women. Dr. T. W. Beeman, Perth.

22,259 Photograph of two Zulu girls. Dr. T. W. Beeman, Perth.

22,260 Horn rattle, wooden handle, used in pagan dances on the Six Nation Reserve. Red Cloud, (a Cayuga.)

22,261 Turtle-shell rattle, painted, Iroquois pagan dances. Red Cloud.

22,662 Small turtle rattle (woman's, no handle). Red Cloud.

22,663-64 Dance knee-bands with bangles of pigs' hoofs and exploded brass cartridges. Red Cloud.

22,665 Drum made from a small iron-hooped barrel and painted with red, green, yellow, black, and white. Red Cloud.

22,266 Cayuga turtle rattle (Wm. Henry), Tuscarora Reserve.

22,267 Long head-dress of beaded cloth and feathers. Red Cloud.

22,268 Fur kilt or waist dress of fur. Tuscarora Reserve. Red Cloud.

22,269. Fur pouch with partridge bangles. Red Cloud.

22,270 Fur pouch with beaded shoulder straps. Red Cloud.

22,271 Small spherical gourd rattle with wooden handle, painted red. Tuscarora Reserve. Red Cloud.

From 22,260 to 22,271 were the property of Red Cloud, a Cayuga, and worn by him on ceremonial occasions.

22,272 Object of red argillite 3⅝ inches long, nearly ¼ thick, 1¼ inches wide at one end and tapering (all the taper being on one edge) to less than ¼ inch at the opposite end; perforated lengthwise with a hole about 2 mm. in diameter. Found in a grave with a number of others of similar form at Taylor's Point, Sandwich, Ont. H. R. Hatcher, Comber.

22,273 Hook cut from sheet copper and found by the late Col. T. Brock, Louth Township, Lincoln County. C. A. Case.

22,274 Flint knife, Dean's Mills, lot 5, con. 8, Clinton. C. A. Case.

22,275-81 Six flint arrows. Dean's Mills, lot 5, con. 8, Clinton. C. A. Case.

22,282 Bone bead. Dean's Mills, lot 5, con. 8, Clinton. C. A. Case.

22,283 Chip from stone axe. Dean's Mills, lot 5, con 8, Clinton. C. A. Case.

22,284 Roughly triangular, weathered stone, weathered at wide end.

22,285-86 Pendants, plummets or sinkers, and

22,287—Pendant or plummet made from columella of large univalve. (These three the notched at one end as if for suspension.) 22,284-87 from Chokoloskee Island or Key, Lee County, Florida, where they were ploughed up. From Mr. Clarence B. Moore, Philadelphia.

22,288 Life mask, Tommy Lane (Koyopkud), aged 50, Tribe Puyallup.

22,289 Life mask, Dave Dan (Ptduabsh), aged 35.

22,290 Life mask, Mary Leshi Borsatl, aged 40. Half Nisqually half Tenino.

22,291 Life mask, Lucy Leshi (daughter of 22,290).

22,292 Life mask, Louis Bob, aged 19. Tribe Puyallup.

22,293 Life mask, Louis Leshi (son of 22,290), aged 19.

22,294 Life mask, Jenny James, aged 26. Father Puyallup. mother half Yakima, and half Snohomin.

22,288, 22,294 from State of Washington.

22,295 Life mask, Charlie (Kakoititla), aged 28, Tribe Koskimo.

22,296 Life mask, Johnnie (Khaiuskana), aged 32, Newitte.

22,297 James (Khanias), brother of Johnnie, aged 16, Newitte.

22,298 Life mask, Lucy (wife of Charlie, 22,295), aged 30, Koskimo.

22,299 Life mask, Sam (Penaquoity), aged 35, Alert Bay.

22,301 Life mask, Ned, aged 35, Alert Bay.

22,301 Life mask, Nedaged, aged 35, Alert Bay.

22,302 Life mask, Alice, aged 27, Bella Coola.

22,303 Ann (sister of Alice), aged 24, Bella Coola.

22,295 to 22,303 from Vancouver Island, British Columbia.

22,288 to 22,303 by exchange, from Field Col. Mus., Chicago.

22,304 Similar to number 22,272, and found in the same grave. From Mrs. James Lawler, Toronto.

22,305 Bird amulet,imperfect,found in Methodist burying ground, Jordan station, Lincoln County, Ont. A. J. Painter.
22,306-8 Skulls from ossuary, Dean's Mills, lot. 5. con. 8, Clinton Township, Lincoln County. Dr. G. M. Bowman.

22,309 Net carrying-bag. Lengua.
22,310-12 Net bags. Chamococco Brabo.
22,313 Knit cordage bag, striped. Chamococco Brabo.
22,314 Knit cordage bag, striped, Mataco.
22,315 Knit cordage bag, check design. Guano.
22,316 Knit cordage, striped. Chamococco Brabo.
22,318 Bag, bark and cordage. Chamococco Brabo.
22,319 Woman's belt, cordage. Toba.
22,320-21 Hanks of plaited fibre cordage. Sanapana
22,322-24 Bundles of rope. Chamococco Brabo.
22,325 Bridle of hair. Chavante.
22,326 Necklace of black seeds. Cadoca.
22,327 Rattles of half seeds. Guana.
22,328-9 Rattles of half seeds. Omiri.
22,330 Tin ornament crescent. Coroado.
22,331 Wooden ear-plug. Lengua.
22,332 Flute or whistle (small). Apiaca.
22,333 Shell ear pendants and beads. Caiugua.
22,334 Necklace. Lengua.
22,335 Necklace. Angayte.
22,336 Ear pendant, shells and feathers. Lengua.
22,337 Belt of bristles. Apiaca.
22,338 Necklace, beads and monkey bones. Guato.
22,339 Bone comb. Caiugua.
22,340 Necklace of beetle backs. Apiaca.
22,341 Ankle rattle of deer hoofs. Chamococco Brabo.
22,342 Rattling belt, cordage, deer hoofs. Guano.
22,343 Rattling belt, cordage, deer hoofs. Chamococco Brabo.
22,344 Necklace of cane, reed and beetle necks. Tupi.
22,345 Necklace of cane, reed and beetle necks. Caiugua.
22,346-7 Necklaces of cane and brown berries. Chamococco Brabo.
22,348 Necklace of cane and beetle necks.
22,349 Necklace of cane and berries. Cadoca.
22,350-79 Thirty arrows. Cuximanapana.
22,380-89 Ten arrows. Sanapana.
22,390-99 Ten arrows. Guano.
22,400-02 Bows (plain). Cuximanapana.
22,403 Wooden club. Angayte.
22,404 Wooden spear. Chevante.
22,405 Head ornament of feathers. Omiri.
22,406 Head ornaments of feathers. Guano.
22,407-08 Head ornaments of feathers. Mataco.
22,409-10 Head ornaments of feathers. Chamococco Brabo.

22,411-13 Feather arrows (insignia of warriors). Chamococco Brabo.
22,414 Feather belt. Angayte.
22,415 Feather arrow. Chamococco Brabo.
22,416 Ear ornment of grass and red feathers. Omiri.
22,417 Feather head-dress. Chamococco Brabo.
22,418-21 Insignia of chiefs. Chamococco Brabo.
22,422-23 Ear ornament, rolls of feathers. Chamococco Brabo.
22,424-25 Head-dresses of feathers. Caiugua.
22,426 Ear ornament of white feathers. Angayte.
22,427-31 Ear ornaments feathers. Chamococco Brabo.
22,432 Ear ornament. Sanapana.
22,433-34 Ear ornaments. Angayte.
22,435-37 Ear ornaments. Chamococco Brabo.
22,338 Ear ornament. Apiaca.
22,439 Ear ornament. Chamococco Brabo.
22,440 Ear ornament. Mataco.
22,441 Ear ornament. Chamococco Brabo.
22,442-48 Ear ornament. Omiri.
22,449-52 Ear ornaments. Guana.
22,453-59 Feather bracelets. Chamococco Brabo.
22,460-67 Feather head-dresses. Chamococco Brabo.
22,468-72 Waist bands of feathers.
22,473-76 Feather ornaments. Mataco.
22,477-83 Waist bands of emu feathers. Chamocco Brabo.
22,484-90 Net bags.
22,491-93 Bags netted. Chamococco Brabo.
22,494 Closely woven bag.
22,495 Ear ornament.
22,496 Ear ornament (rattles).
22,497 Hammock. Mataco.
22,498 Wooden ear plug.
22,499 Necklace of beads and femurs.
22,500 Necklace of overlapping shell discs.
22,501 Narrow strip of skin, with bristles, twisted.
22,502 Necklace of cordage, shell pendant (discs). Guarani.
22,503 Necklace of cordage.

From 22,309 to 22,503 are from Paraguay, and were procured by exchange from the Field Col. Mus., Chicago.

22,504 Very roughly made small axe or chisel. Yellow Point Mound. Lot 18, con. 1, Louth Tp., Lincoln Co.

22,505 Unfinished pendant (?) of schist. Mound, lot 18, con. 1.

22,506-07 Roughly formed flints. These and 22,505 were found with human remains, mound, lot 18, con. 1, Louth Tp.

22,508 Piece of chert. Mound, lot 18, con. 1, Louth Tp.

22,509 Small core and three chips of flint. Mound, lot 18, con. 1.

22,510 Slightly grooved stone adze. Lot 2, con. 8, Blenheim Tp., Oxford Co. Robert Guthrie, per W. J. Wintemberg.

22,511 Unfinished "banner-stone" (half pecked, half polished and unbored). Lot 8, con. 13, Blenheim Tp. W. J. Wintemberg.

22,512 Cast of striped slate "ceremonial" stone, roughly round edgewise, one side slightly hollowed, the other somewhat convex. A hole through one end, with part of another at the opposite end. From collection of Mr. Rathbun. Drumbo, per W. J. Wintemberg.

22,513 Flexed leg-bones. Mound, lot 18, con. 1, Louth Tp., Lincoln Co.

22,514 Human cranium. Mound, lot 18, con. 1, Louth Tp., Lincoln Co.

22,515 Flat pebble "sinker." Mound, lot 18, con. 1, Louth Tp., Lincoln Co.

22,516 Flakes of black mica. Mound, lot 18, con. 1, Louth Tp., Lincoln Co.

22,517 String of small white cowries, (formerly used as currency), from Multan, India, collected by Col. S. H. P. Graves, per Mrs. J. H. Thompson, Toronto.

22,518 Stone pipe head. Lot 28, con. 3, West York. Bracondale. D. G. McNab.

22,519 A piece of limestone and chert, the former water-worn so as to resemble roughly an animal's head. As this specimen was found associated with Indian graves on Catfish Island, Hay Bay, Prince Edward County, it was possibly regarded by the Indians in some respectful way. Judge E. Merrill, Picton.

22,520 Stone pipe, Walker farm, Brantford Township, Brant County, J. S. Heath.

22,521 Small red clay pot, rudely formed and rudely ornamented (in black), recently made by the Mississauga Indians near Sault Ste. Marie, under the direction of Mr. L. O. Armstrong.

22,521½ Small red clay pot, recently made by the Mississauga Indians, near Sault Ste. Marie, under the direction of Mr. L. O. Armstrong.

22,522 Navajo loom and tools, complete.

22,523 Pomo basket for grinding corn.

22,524 Pomo food basket from Northern California.

22,525 Pomo cradle from Northern California.

22,526 Pima cradle. Phoenix, Arizona.

22,538 Pima food bowl. Phoenix, Arizona.

22,531-33 Pima small bowls. Phoenix, Arizona.

22,534-36 Pima ollas. Phoenix, Arizona.

22,537 Pima bowl with animal figures. Phoenix, Arizona.

22,538 Pima food bowl. Phoenix, Arizona.

22,539 Pima olla. Phoenix, Arizona.

22,540 Apache Yuma (food bowl).

22,541-42 Food bowls. San Carlos, Apache.

22,543 Food bowl. Tanto, Apache.

22,544 Food bowl. San Carlos, Apache.
22,545 Food bowl. Miscallera, Apache.
22,546 Supai cradle.
22,547 Cahulilla food tray. South California.
22,548-49 Hoopa caps. North California.
22,550 Hoopa food bowl. North California.
22,551 Moqui (proper name "Hopi Katzina") food bowl.
22,552 Moqui (proper name "Walpi Misa Hopi") placque.
22,534-54 Food trays. Pitt River, North California.
22,555 Water bottle. Pitt River, North California.
22,556 Hoopa cradle. Humboldt County, California.
22,557 Pima olla (from Arizona, red).
22,558-60 3 Zuni ollas, N. W. New Mexico.
22,561-68 8 Acoma ollas, N.W. New Mexico.
22,569-81 Lot of pieces, various localities.
22,582-97 Lot of 16 small pieces, various localities.
22,598-605 Prehistoric pottery (18 pieces), found near Baker's Butte, Arizona.
22,606-67 Metates, near Phoenix, Arizona.
22,608-13 Five large circular stones (perforated), near Phoenix, Arizona.
22,612 Oval-shaped perforated stone, near Phoenix, Arizona.
22,614 Oval-shaped stone of tufa, with projection at one end, partly bored in the middle. Near Phoenix, Arizona.
22,615-16 Two small stone paint pots. Near Phoenix, Arizona.
22,617-26 Grooved stone axes. Near Phoenix, Arizona.
22,627-30 Tablets of slate, from 2¾ by 3¾ to 5 by 7 inches, with incised border lines. Near Phoenix, Arizona.
22,631-33 Tiles hung as charms over Moqui fire places. Near Phoenix, Arizona.
22,634 Steatite tablet, 2 by 4 inches, ¾ of an inch thick, hollow groove across middle, one side pitted with small holes. Near Phoenix, Arizona.
22,635-41 Rough representations of the human form, mostly in tufa. Near Phoenix, Arizona.
22,642-43 Turtle-like forms in tufa. Near Phoenix, Arizona.
22,644-46 Rough, uncertain, animal forms in tufa. Near Phoenix, Arizona.
22,647-48 Turtle-like forms in tufa, hollowed or pitted in the back. Near Phoenix, Arizona.
22,647-48 Turtle-like forms in tufa, hollowed or pitted in the back.
22,649-61 Twelve pendants or sinkers, of tufa.
22,662-63 Stone pendants or sinkers.
22,644 Small objects of tufa. Had originally eight arms from one centre.
22,665 Small rough human form in clay.
22,666 Small lama-like head in clay.
22,667 Small animal form (nondescript) in clay.

22,668 Small animal form (quadruped) in clay, head off.
22,669 Small roughly cylindrical clay object.
22,670 Pendant or sinker.
22,671 Rough representation of animal form.
22,672 Small cylinder of hematite. 1¼ inches long, ½ inch in diameter.
22,673-76 Shells (salt water), cardium sp.(?)
22,677 Small tool of flint, sharply veined at one end.
22,678 Small slate pendant, incised.
22,679 Small imperfect object of schistose slate.
22,680 Small slate tablet.
22,681-82 Thin slate dics, perforated in centre, 1⅞ inches in diameter.
22,683-96 Spindle-whorls.
22,689 Shell (salt-water) cardium. (?)
22,698-99 Rough representations of animal forms in tufa.
22,700 Ninety-four arrowheads, etc.
22,701 Miscellaneous fragmentary specimens of shell work.
22,702 Miscellaneous fragmentary specimens of obsidian.
22,703 An amygdaloidal sandstone tube.

From 22,647 to 22,703 are from Salt R. Valley, Arizona, and were found by J. W. Benham of Phoenix.

22,704 Large and unusually formed celt-liked tool 12½ inches long, 2¼ inches thick in the middle, tapering to a pointed ball at one end and a cutting edge at the other. One side looks as if the beginning of a hollow had been made for a gouge. Giver unknown—specimen left in Museum without any clue.
22,705 Musical instrument, consisting of ten iron tongues of various lengths, fastened on a small board, 4½ inches by 6½ inches, West Africa.
22,706 Musical instrument, consisting of eight iron tongues of various lengths, two tongues missing, on small carved board, 4 in. by 7 in. West Central Africa.
22,707 Musical instrument, consisting of nine iron tongues, one missing, on carved board.
22,708-9 Large wooden spoons, made by Mission Station boys. Cisamba, Bihe. Angola, W.C.Africa.
22,708-9 Large wooden spoons, made by Mission Station boys.
22,710 Wooden female image, eleven inches high. Cisamba.
22,711 Brown grass-cloth head-dress. Luba Country. W. C. Africa.
22,712 Undyed grass-cloth, Lovali Country. W. C. Africa.
22,713 Rawhide belt (four strands twisted), Luba Country. W. C. Africa.
22,714 Wooden club, with carved spherical head, Bihe. W. C. Africa.

22,715 Wooden club, with pear-shaped head. Bihe, W. C. Africa.
22,716 Water-gourd or beer calabash, with burnt triangular, and other patterns. Benguela, S. W. Africa.
22,22,717 Antelope horn, used by the natives for various purposes. Bailunda, W. C. Africa.
22,718 Antelope horn, filled with bones, etc., as a charm against evil spirits. Bihe, W. C. Africa.
22,719 Large native basket. Bailunda (Angola).
22,720 Cap made of string (Fetish priest)—Ciyumka. Bihe. Angola.
22,721-23 Bamboo plates or plaques. Angola.
22,724 Parcel of salt, used as a medium of exchange. Bailundu.
22,725 Whisk of horse-hair, with handle of alligator skin, the hollow having two small antelope horns as charms. Fetish priest.
22,726 Iron spear, bamboo handle. Garanganzi, Barotse Valley.
22,727 Iron spear, with chisel-pointed cutting tool at oposite ends, fastened with native copper wire. Ulu.
22,728 Iron spear, bamboo handle, head bound with leather thongs. Garanganzi.
22,729 Iron spear, wooden handle, partly leather-covered, and ornamented with corase fur. Garenganzi.
22,730-37 Eight plain arrows. Angola. W. C. Africa.
22,738 Small native clay pot. Fetish priest.
22,739 Fetish hoe. Priest.
22,740-47 Native knives. Various parts of W. C. Africa.
22,748 Iron punch. Bihe. Angola.
22,749 Feather head-dress (chief's). Bailundu. Angola.
22,750-54 Native belts. Various parts of W. C. Africa.
22,755-56 Native baskets (large one from Luba Country)small one from Bailundu.)
22,757 Axe. Bihe.
22,758 Horn of water-buck. Bihe. Angola.

From 22,705 to 22,758 are the gift of Mrs. John Currie, Toronto, and were collected by her son, the Rev. W. T. Currie, of Bihe, Bailunda, Angola. West Central Africa.

22,759 Leaf-shaped flint (one of 150) found in a cutting for gas pipe on Devine street, Sarnia. Albert Wheeler, Sarnia.
22,760 Rough ball. Found 3 feet 6 inches below surface, Devine street, Sarnia. The ball was lying near a heap of leaf-shaped flints, numbering at least 150. A. Wheeler, Sarnia.
22,761 Beginning of a Navajo Indian basket to show how the work is done. Arizona. J. W. Benham.
22,762 "Cat-tail" used as core for Pima. Arizona.
22,763 Coil of split cat-tail, used in Navajo basketry.
22,764 "Devil's claws," (Martynia proboscidea), a large seed pod, used to form the dark portions of the pattern, in Navajo basketry. J. W. Benham.
22,765 Turtle-like form in tufa. J. W. Benham, Phoenix, Arizona..

22,766 Roughly cylindrical form in tufa. 2½ by 2 inches. J. W. B.

22,767 Large water-worn stone, having a resemblance to a grooved axe. Found near Peoria, Ill., and presented by Mr. Alonzo Wookey, Peoria. (The dimensions of this stone are 12 inches long, 8½ inches wide, and 5 inches thick.)

22,768 Snuff-box, made from bamboo, richly carved. Bihe. Angola, S. Africa. Mrs. John Currie, Toronto.

22,769 Small, double-edged axe-like object of Huronian slate, quadrangular in cross section, each side slightly hollowed length-wise. 5 inches long, about 1⅛ inches wide, and ¾ inches thick in the middle, where it is perforated, with a hole tapering from ⅜ of an inch to 7-16. Mr. Fish, Springfield, Toronto Township. Per Miss Switzer.

22,770 White beaded mocassins, with red and blue pattern. Worn by Red Cloud, a Cayuga.

22,771 Spear head, Grand River Valley, opposite Bow Park Farm, Brant County. F. W. Waugh.

22,772-73 Leaf-shaped spear heads, Nipissing. F. W. Waugh.

22,774-75 Flints, near Lake Manitou, Manitoulin Island. F. W. Waugh.

22,776 Drill, Sealey Farm, Brantford Tp., Brant County. F. W. Waugh.

22,777 Iron drill, Sealey Farm, Brant County. F. W. Waugh.

22,778 Flint Knife, Grand River, above Brantford. F. W. Waugh.

22,779 Largest square-mouthed pipe yet found. Walker farm, Brantford Tp. F. W. Waugh.

22,780 Perfect clay pipe. Sealey Farm. F. W. Waugh.

22,781 Maple sugar moulds. Manitoulin Island, east end. Ojibwa (Mississauga.) F. W. Waugh.

22,782 Indian yoke for carrying sap Manitoulin Island, east end. (Mississauga). F. W. Waugh.

22,783 Small celt, Sealey Farm, Brant County. F. W. Waugh.

22,784-89 Flints, surface finds in N. Brantford Township. F. W. Waugh.

22,790-95 Spear heads, opposite Bow Park Farm, Brantford Township. F. W. Waugh.

22,796 Small scraper. Sealey Farm, Brant County. F.W.Waugh.

22,797-810 Fourteen flints. Sealey Farm, Brant County. F. W. Waugh.

22,811-12 Horn pins. Sealey Farm, Brant County. F.W.Waugh.

22,813-14 Two thigh bones, from ossuary, lot 5, con. 8, Clinton Township, Lincoln County. T. W. Moyer, Campden.

22,815 Femur, upper third much bent, perhaps the result of a fracture. T. W. Moyer, Campden.

22,816 Unfinished gorget. Sealey Farm, Brant County. F. W. Waugh.

22,817-20 Unburnt clay pots. Arizona. J. W. Benham, Phoenix,

22,821-22 Pieces of clay used in making Zuni pottery in Arizona. J. W. Benham, Phoenix.

22,823 Teeth of small animal used as a charm and carried on the person. Basutoland, Africa.

22,824-40 Seventeen stone discs. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,841 Two naturally perforated pebbles, two smoothed circular pebbles. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,842 Fragment of clay pipe bowl, with parallel lines round it. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,643 Fragment of clay pipe bowl, with human mask. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,844 Hammer stone. Lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,845 Degraded celt. Lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,846 Partly or roughly grooved pebble. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,847 Oval smoothing stone. Lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,848-86 Thirty-nine pottery discs. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,887 Moulded bead of clay, with finger nail markings. Village site 23, lot 12, con. 1. A. Ferguson.

22,888 Human masked clay pipe bowl. Village site 3, lot 5, con. 5; Bexley. Wm. Irwin.

22,889 Unbored bead, made from a small pebble. Village site 3, lot 5, con. 5, Bexley. Wm. Irwin.

22,890-2 Small perforated soapstone beads. Village site 3, lot 5, con. 5, Bexley. Wm. Irwin.

22,893 Bone awl. Lot 5, con. 5, Bexley. Wm. Irwin.

22,894 Stone pick-pointed tool, from Jas. McGirr, Bolsover. Found by Wm. Freeland, near the Portage Road.

22,895 Stone scraping tool, roughly resembling a draw knife blade. S. Truman, lot 22, con. 8, Eldon Tp., site 9.

22,896 Long knife or lance head of quartzite. Lot 1, con. 6, Carden, north bank of Talbot River, M. Byrnes.

22,897-900 Four rough celts. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,901 Circular hammer-stone. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,902 Circular pebble, used as smoothing stone. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,903-8 Pottery. Village site 23. J. H. Carnegie. Indian Point, Balsam Lake, Bexley.

22,909 Bead from bird's wing-bone. J. H. Carnegie. Indian Point, Balsam Lake, Bexley.

22,910 Charred corn and what appears to be a charred acorn. (Neil Clarke.) Village site 23, lot 12, con. 1, Fenelon Tp.

22,911-13 Clay pipe bowls. (Neil Clarke.) Village site 23, lot 12, con. 1, Fenelon Tp.

22,914-15 Clay pipe stems, one plain and one representing a snake. (Neil Clarke.) Village site 23, lot 12, con. 1, Fenelon Tp.

22,916 Small perforated spiral shell. Village site 23, lot 12, con. 1, Fenelon Tp.

22,917 Sea shell (edible mussel). Village site 23, lot 12, con. 1, Fenelon Tp.

22,918 Shell columella, tropical. Village site 23, lot 12, con. 1, Fenelon Tp.

22,919 Beaver's tooth, may have been used as a chisel. Village site 23, lot 12, con. 1, Fenelon Tp.

22,921 Bear's tooth. Village site 23, lot 12, con. 1, Fenelon Tp. Neil Clarke.

22,922 Perforated metatarsal bone (deer). Village site 23, lot 12, con. 1, Fenelon Tp. Neil Clarke.

22,923 Metatarsal bone rubbed down on two sides. Village site 23, lot 12, con. 1, Fenelon Tp. Neil Clarke.

22,924-25 Bone beads. Village site 23, lot 12, con. 1, Fenelon Tp. Neil Clarke.

22,926-28 Bone needles, small and neatly made. Village site 23, lot 12, con. 1, Fenelon Tp. Neil Clarke.

22,929-30 Portions of eyed needles. Village site 23, lot 12, con. 1, Fenelon Tp. Neil Clarke.

22,931-36 Bone awls. Village site 23, lot 12, con. 1, Fenelon Tp. (Neil Clarke.)

22,937-49 Fragments of pottery representing lip decoration, finger-nail markings, and boring near a fracture for repairing purposes. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,950 Clay pipe bowl. Village site 24, lot 23, con. 1, Fenelon Tp. A. Ferguson.

22,951 Metatarsal bone, rubbed down on two sides. Village site 24, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,952 Bone bead. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22953-59 Pottery disc. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,960-69 Bone awls. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,970 Unio shell, through which there seems to have been broken an oblong hole. Village site 24, lot 23, con. 1, Fenelon Tp. A. Ferguson.

22,971 Fragment of cup-shaped pipe. Village site 24, lot 23, con. 1, Fenelon Tp. A. Ferguson.

22,972 Small ball of burnt clay. Village site 24, lot 23, con. 1, Fenelon Tp. A. Ferguson.

22,973 Small roughly made celt. Lot 3, North Portage Road, Bexley Tp. John Black.

22,974 Gun flint. West Bay, Balsam Lake, Bexley Tp.

22,975-79 Bones showing ends cut off. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,980 Bone skin dresser. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,981-85. Bone awls. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,986-87 Metatarsal bones, rubbed down on two sides. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,988-89 Deer horn tips. Village sites 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,990-91 Bone heads. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,992-93 Fragment of bone. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,994-96 Bear's teeth. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,997 Beaver's teeth. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,998-99 Bone and horn socketed implements. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

23,000 Half of bone needle. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

23,001 Bone point. Village site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

23,002-14 Thirteen pieces of pottery.

22,015 Mealing stone. Site 23, lot 12, con. 1, Fenelon Tp. A. Ferguson.

22,016 Mealing stone. Site 23, lot 12, con. 1, Fenelon Tp. G. E. Laidlaw.

22,017 Mealing stone. Site 27, Birch Point, South Bay, Balsam Lake. A. Ferguson.

23,018 Gorget of Huronian slate. Ward's Farm, Bexley P.O. Presented by Mrs. R. Campbell, Kirkfield, Ontario.

23,019 Bear's tooth, worked. Site 8, head of Portage Road, Block E, Bexley. J. W. Laidlaw.

23,020 Arrowheads. Site 8, head of Portage Road, block E, Bexley. J. W. Laidlaw.

23,021-26 Scrapers. Site 8, head of Portage Road, Block E, Bexley. J. W. Laidlaw.

23,027 Perforated bone needle, 2½ inches long. Site 8, head of Portage Road. J. W. Laidlaw.

23,028 Small, oval, well-made scraper. Neil Sinclair's Farm, South Bay, Balsam Lake, Fenelon Tp. J. W. Laidlaw.

23,029 Large leaf-shaped black flint knife. Neil Sinclair's Farm, South Bay, Balsam Lake, Fenelon Tp. J. W. Laidlaw.

23,824 to 23,029 per Lt. George E. Laidlaw, Victoria Road.

23,030 Pair of coarse fur leggings. Eskimo.
23,031 Pair of deerskin shoes with hair on. Eskimo.
23,032 Pair of undressed sealskin mitts. Eskimo.
23,033 Pair of deerskin shoes. Eskimo.
23,034 Pair of sealskin boots. Eskimo.
23,035 Pair of long leggings. Eskimo.
23,036 Sealskin bag. Eskimo.
23,037 Skin and line with bone toggles and bone handle, the skin for inflation. Greenland.
23,038 Whaleline.
23,039 Hooded skin coat with bone buttons and ornaments. Eskimo.
23,040 Pair of child's legging boots. Lapland Eskimo.
23,041 Pair of child's small ornamented white and red leather shoes. Eskimo.
23,042-44 Three pairs untanned high moccasins. Eskimo.
23,045 Net. Eskimo.
23,046 Pair of low red leather moccasins. Eskimo.
23,047 Pouch of monkey skin. Guiana.
23,048 Bone mouthpiece for inflating skin float. Eskimo.
23,030 to 23,048 from Field Col. Mus., by exchange.

23,049 Stone pipe, Huronian slate, representing a raven with beak pointing to the feet. Lot 18, con. 13, Reach Tp., Ontario County. Mr. Charles Rennie, Seagrave, per G. E. Laidlaw.
23,050 Stone pipe, Huronian slate, representing an owl. Lot 18, con. 15, Tiny Tp. Herbert G. Glaspell, per E. W. Glaspell and Geo. E. Laidlaw.
23,051 Iron tomahawk, reduced in size by Indian method. Lot 15, con. 8, Eldon. A. Ferguson, per G. E. Laidlaw.
23,052 Piece of leaf thatching, from West African kraal. Miss Eliz. J. Letson, Buffalo.
23,053-5 Three obsidian arrow points. Lincoln County, South Dakota. James Boyle, Sarnia.
23,056 Mealing stone. Bexley Tp. Lieut. Geo. E. Laidlaw.
23,057 Mealing stone. Balsam Lake. Lieut. Geo. E. Laidlaw.
23,058 Mealing stone. Bexley Tp. Lieut. Geo. E. Laidlaw.
23,059 Mealing stone. Bexley Tp. Lieut. Geo. E. Laidlaw.
23,060-62 Mealing stones. Balsam Lake. Lieut. Geo. E. Laidlaw.
23,063 Quern or hand mill. Shetland Islands. Thos. Williamson, Toronto.
23,064-67 Flint scrapers. Sealey Farm, Brantford Tp. F. W. Waugh.
23,068-69 Serrated edged scrapers. Sealey Farm, Brantford Tp. F. W. Waugh.
23,070-82 Small triangular arrowheads. Sealey Farm, Brantford Tp. F. W. Waugh.

23,083-84 Barbed arrowheads. Sealey Farm, Brantford Tp. F. W. Waugh.

23085 Small, three-armed flint, perhaps a drill. Sealey Farm, Brantford Tp. F. W. Waugh.

23,086 Small, double-barbed arrow. Sealey Farm, Brantford Tp. F. W. Waugh.

23,087 Birch bark canoe (2 fathom), made by an Indian named Quill. White Bear Lake, between Lake Temiscaming and Lake Temagami.

23,088 Blue print (four views) of large kneeling human figure (ten inches high), stone pipe. Mound, Tennessee River. M. A. Kirby, Florence, Ala.

23,089 Stone pestle. Dr. T. E. Craig, Manchester, Indiana.

NOTES.

The specimen represented by fig. 1 (22,511) is an extremely interesting one, showing, as it does, several stages in the progress of

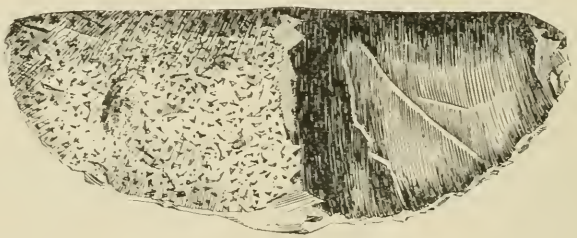


Fig. 1. (22,511) ½ diameter.

making what we call a "banner stone" of the butterfly type, from the rough. In general outline, it is tolerably symmetrical, and if finished would probably be almost perfectly so, as we generally find to be the case with specimens of this kind. Along the rounded edges we can still observe traces of the flaking, or chipping process, by means of which the stone was brought into approximate shape, and while one-half of the whole surface exemplifies the succeeding pecking process, the other half has been polished enough to remove this roughness. The light lines shown on this portion of the cut are scratches, perhaps made by the plough. Not even a beginning has been made in the boring of the hole. It would not be easy to find another specimen of this kind to illustrate so well the steps taken by the old workmae, in his rude way, for the purpose of reducing a piece of shapeless slate to form and symmetry, with an ultimate object in view, which, up to the present time, remains inexplicable.

This instructive specimen is presented by Mr. W. J. Wintemberg, and was found on lot 8, concession 13, in the Township of Blenheim.

In some respects this stone pipe-head (fig. 2) differs from anything of the kind in our cases. It is of a light gray limestone,

and is neatly made. The row of small holes or pits round the base are unusual. This pipe was found on lot 28, concession 3, west half, of York Township, quite near to Toronto, and was presented to the Museum by Mr. Donald G. McNab of Bracondale.

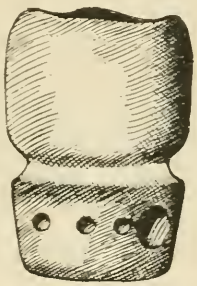


Fig. 2. (22,518) $\frac{2}{3}$ diameter.

The trained eye will at once perceive that the clay vessel represented by fig. 3 is not of northern origin. East of the Mississippi and the great lakes, and north of the Ohio, it is difficult to find incised, ornamental lines in curved form, on pottery. In Ontario, at any rate, all decorative markings consist of dots, slight elevations on the surface, produced by pressure of a blunted point from the

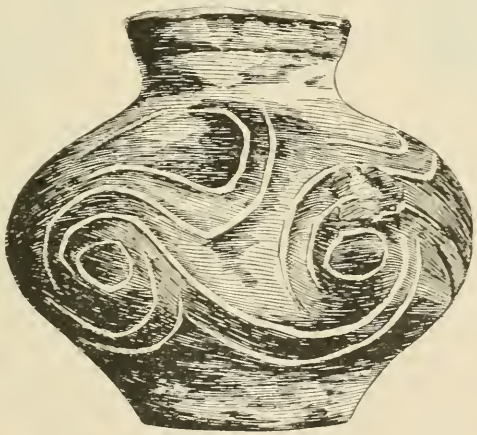


Fig. 3. (22,239).

opposite side, small circles made with the end of a reed or other tube, and straight lines, arranged either in parallels or to form triangular patterns.

Fig. 3 is also flat-bottomed, and in this respect differs from all Canadian pots, and from most others found in northeastern America.

The method of working is shown by means of this vessel, as it is clear that the body and the lip are the result of separate mouldings, the luted edge of the latter having been left in a somewhat rough condition.

For the excellent piece of pottery here figured we are indebted to Miss Josephine Keller of Vicksburg, Miss., near which city it was found.

A philanthropic and commercial attempt has recently been made by Mr. L. O. Armstrong, Colonization Agent of the Canadian Pacific Railway, for the purpose of inducing the Ojibwas of Algoma (in what is claimed to be the Land of Hiawatha) to revive their ancient operative and artistic skill in the making of such objects as may be sold to tourists and others who desire samples of Indian workmanship. In other parts of the continent the natives reap considerable profit from the sale of pottery, basketry, woven goods, carvings in stone, ivory and wood, and from the production of axe-handles, toboggans, snowshoes and bead-work.

Fig. 4. (22,521) ½ diameter.

Fig. 5. (22,521½) ½ diameter.

Mr. Armstrong's project is a laudable one, and all friends of the ancient race will wish it success. Pottery seems to have struck him as a desirable class of work, and one in which the people would probably excel, and it would appear that a considerable quantity of this kind of ware was turned out by the people under his guidance last summer. The cuts—figures 4 and 5—illustrate what are said to be two of the most inferior vessels made, all the better ones having met with a better market. The larger vessel represented here is four inches high.

In the digging of a house-foundation last spring, at Taylor's Point, near Sandwich, Ontario, the workmen came upon an Indian grave, in which were the remains of several Indians. Round the neck of one were some 30 or more objects of catlinite similar to those illustrated by Fig. 6 (22,272 and 22,304), Master H. R. Hatcher, to whom we are indebted for the information respecting this find, as well as directly and indirectly for all that has reached us from the grave, states that, as far as he could learn, the specimens in question seemed to have formed a sort of necklace in connection with one of the skeletons. The beads (if such they were) varied considerably in length, if we regard the two in our possession as average samples, the longer one being almost five inches long, while the other

is only a little over three and five-eighth inches. In thickness both are nearly alike—slightly less than a quarter of an inch. The wide end of the shorter specimen is exactly an inch and an eighth across, while the corresponding end of the other measures barely an inch. Each is bored truly from end to end, the holes not being more than one-sixteenth of an inch in diameter. The smaller specimen is dull

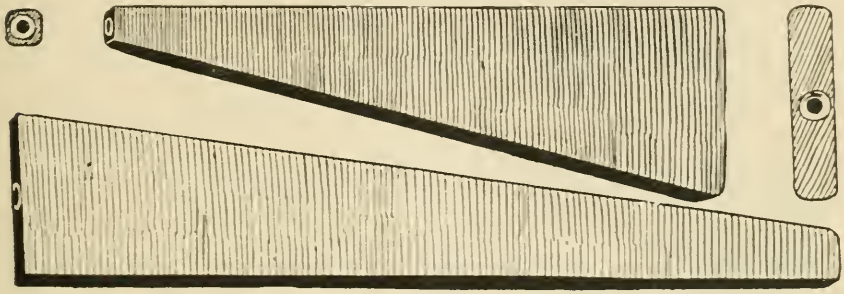


Fig. 6. (22,272 and 22,304).

in color when compared with the larger one, the latter having the bright red that is so characteristic of catlinite.

It is extremely difficult to meet with an absolutely perfect clay pipe, but quite recently we have received one, Fig. 7 (22,780), from Mr. F. W. Waugh, who found it on the Sealey farm, Brantford

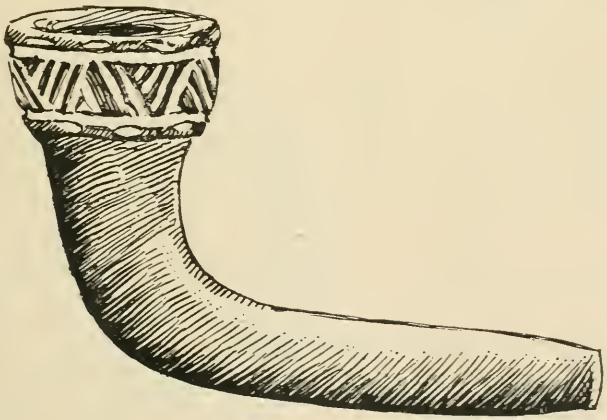


Fig. 7. (22,780), about $\frac{2}{3}$ diameter.

Township, a farm from which we have come into possession of so many fine specimens. Not only is this pipe in perfect condition, but it is considerably larger than most of its class, the bowl measuring an inch and five-eighths across the mouth, and the stem being three inches long.

The horizontal depressions on the upper and lower bands are unusual, but the other markings are of the favorite pattern to which

reference is made by Mr. F. W. Waugh in his paper on the decoration of pottery.

OSSUARY IN CLINTON TOWNSHIP, LINCOLN COUNTY.

On receiving information, near the end of last May, from Messrs. T. W. Moyer of Campden, and A. J. Painter of Jordan Station, that an ossuary had been discovered near Dean's Mills, on lot 5, concession 6, Clinton, a visit was paid to the place within a few days.

Burial places of the kind in question are usually on high

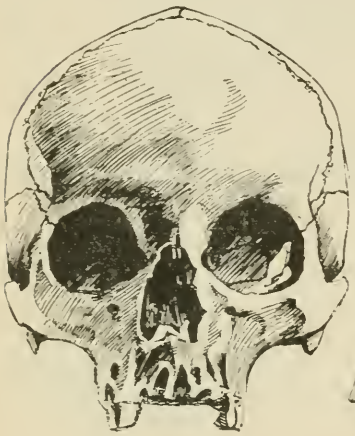


Fig. 8. (22,242).

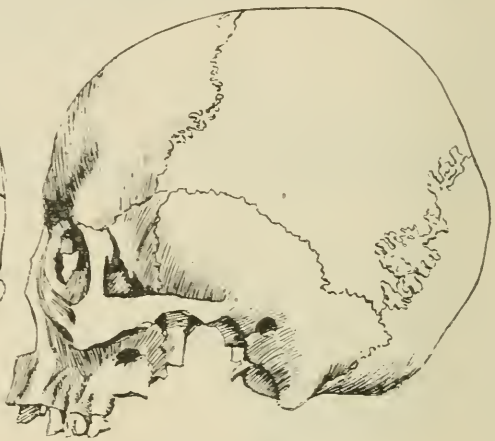


Fig. 9. (22,242).

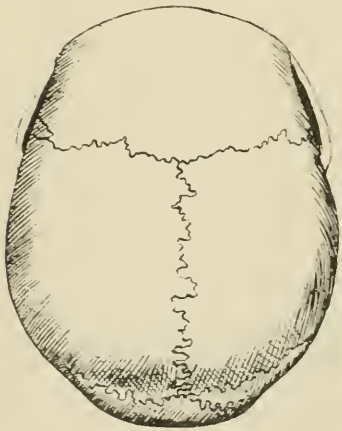


Fig. 10. (22,242).

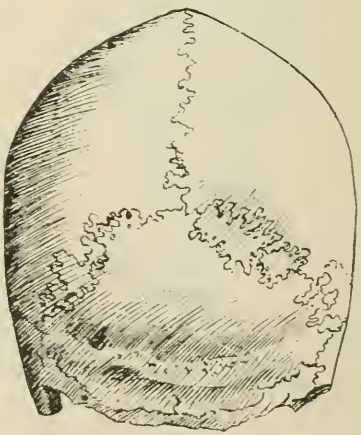


Fig. 11. (22,242).

ground, but this one is on a low, level field, within about three hundred yards north of Mud Creek, which flows into Twenty Mile Creek only some five hundred yards farther east. High ground was evidently not thought desirable, for a little to the west of the ossuary the land rises several feet above the level of the ground here, but this was perhaps not perceptible when the land was in bush.

Before the plough revealed the presence of the grave, there was not even a depression to suggest the possibility of so many human bones lying there, and so near to the surface, for they were covered by scarcely more than six inches of earth. Mr. Painter, to whom I am indebted for these particulars, states that the bones "were lying irregularly, and so closely, as to show they were never put there with the flesh on them." The pit was circular, about fifteen feet in diameter, and was estimated to contain at least two hundred and fifty skeletons. This is only a guess, based on statements made by those who took part in the wild resurrection mania, that seemed to take possession of the neighbors when it became known that an Indian grave had been discovered.

Mr. Moyer of Campden informed me that he saw fully thirty vehicles of various kinds tied up along the fence of the field where the grave was, and that as many as seventy persons were engaged in digging at one time. Unless those who thus labored did so hoping to find relics, it is not easy to understand why there should have been so much excitement; but, in any event, the result was deplorable. What should have proved an excellent opportunity to examine carefully an undisturbed ossuary, in a part of the country where such places of burial are rare, has been lost, and all that is left is a few skulls, most of which are held by those who procured them in the scramble. From Mr. T. W. Moyer, a very good specimen has found its way to the Museum, and three others are the gift of Dr. G. M. Bowman of Jordan. The one from Mr. Moyer, figs. 8 to 11, has several wormian bones on the line of the occipital suture, and one of those presented by Dr. Bowman is similarly, but less numerously marked.

No relics of any kind were found associated with the bones, but in various parts of the field there are traces of camping sites, on which a few flints, bone beads, broken pottery and some imperfect bons awls have been found. Some specimens of these were collected by Mr. C. A. Case of St. Catharines, and presented by him to us.

The femur, of which two views are shown, was found in the ossuary. The unusual degree of curve is remarkable. What seems to be the oblique line of a fracture might account in some measure for the curvature if the break had occurred in childhood, but some physicians regard the apparent place of union as merely an evidence of muscle attachment.

This specimen, with two other femurs, was taken from the ossuary by Mr. Moyer.

From the shallowness of the ashes that mark the old fire-places, Mr. Painter is of the opinion that the place had been occupied as a camping-ground for only a short time.

The only other example known to me of an ossuary occupying such low-lying land was in the Township of Bertie, Welland County, to which reference was made in a former report, and it is somewhat of a coincidence that the only mounds we have any knowledge

of in the Niagara Peninsula are within a few miles of each burying place—on the Lake Ontario side, about seven miles apart, and on the Lake Erie side, some nine or ten. With respect to this circumstance we may wonder whether the ossuaries and mounds are of the same date, and connected with one people, or are the work of different peoples, each of which occupied the ground at different times, or held distinct portions of it contemporaneously. When we remember that for a considerable period the Niagara Peninsula formed part of the Neutral country held by natives belonging to the

Figs. 12 and 13. (22,815).

Huron-Iroquois stock, the last-mentioned contingency is not an improbable one, as it is conceivable, in terms of the understanding existing among the Indians in this part of the continent, that refugee bands from outlying tribes would here find at least a temporary asylum. On such a supposition we can understand why ossuary-making Indians would have to content themselves with any available ground, no matter how low and level, and why, for a similar reason, those of mound-building usage should have chosen such an equally low place for their structure near Port Colborne. It should, however, be remembered that two mounds were constructed on a similar situation at the mouth of the Otonabee River.

THE YELLOW POINT MOUND.

Just before the Twenty Mile Creek* enters Lake Ontario, after flowing by a northeast course through the Townships of Gainsboro', Clinton and Louth, in Lincoln County, it expands into a pond, covering several hundred acres, surrounded by steep, high shores, especially on the right, or east, bank, where the elevation may, in some places, be as much as sixty feet. On both sides the land through which the stream has cut its way is comparatively level, as might be expected from the fact that it was the lake bottom in that not very distant past, when the waters of Ontario laved the base of the

Fig. 14. Yellow Point Mound.

escarpment now known as "The Mountain," which skirts, within a few miles, the greater part of the coast from Niagara River to Macassa Bay.

What is referred to here as a pond, must, at one time, have been a bay, but for some reason, possibly a slight elevation of the land, or a lowering of the lake level, a bar now separates it from Lake Ontario, leaving space for only a narrow channel to carry off the surplus water from the creek.

The east side of the pond is somewhat irregular in outline towards the southern end, and on the top of each of the three principal bluffs is a low mound. Notwithstanding the desire of the owners of the land to preserve these mounds, numerous diggers have made openings, hoping rather to find relics than with any desire to get information relative to structure, age or use.

* In Ontario and the Northern United States this name means a small stream, not a small inlet, as in Britain.

Permission having been secured (although, unfortunately, difficulties afterwards arose) to make a thorough examination of the most northerly of these mounds, on what is locally known as Yellow Point, the work was begun on the 18th of August.

The mound in question was oval, 38 feet in length, almost due north and south, 27 feet wide, and about 3½ feet high.

Near the middle of the southwest quarter, and at a depth of ten inches, a small quantity of black mica was found, in plates from

Fig. 15. Yellow Point Mound, showing details on ground level.

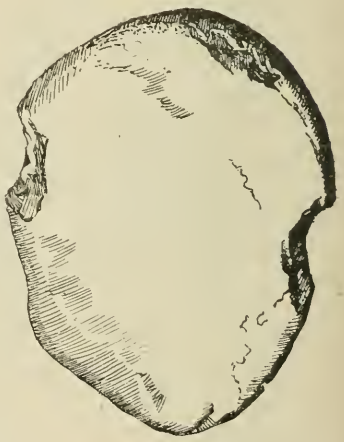


Fig. 16. (22,515). Rough Sinker. ½ diameter.

an inch to two inches in width, and at a depth three feet a little further north were human bones, most of them being much decayed, and along with these was a rough sinker, of the kind usually found near water. Another body had been buried about five feet from the south end, and two feet west of the central line north and south These remains were lying with the head towards the north. Near the middle of the mound in this quarter were a few mussel shells.

In the northwest quarter there was not a particle of anything to indicate human presence or agency beyond the mixed character of the soil, as shown in cross section—the old humus occurring in

small patches and streaks among the yellow, sandy loam, which formed the bulk of the earthwork throughout.

Most of the human remains were found in the east half, between the middle and the margin; two feet from the centre, and

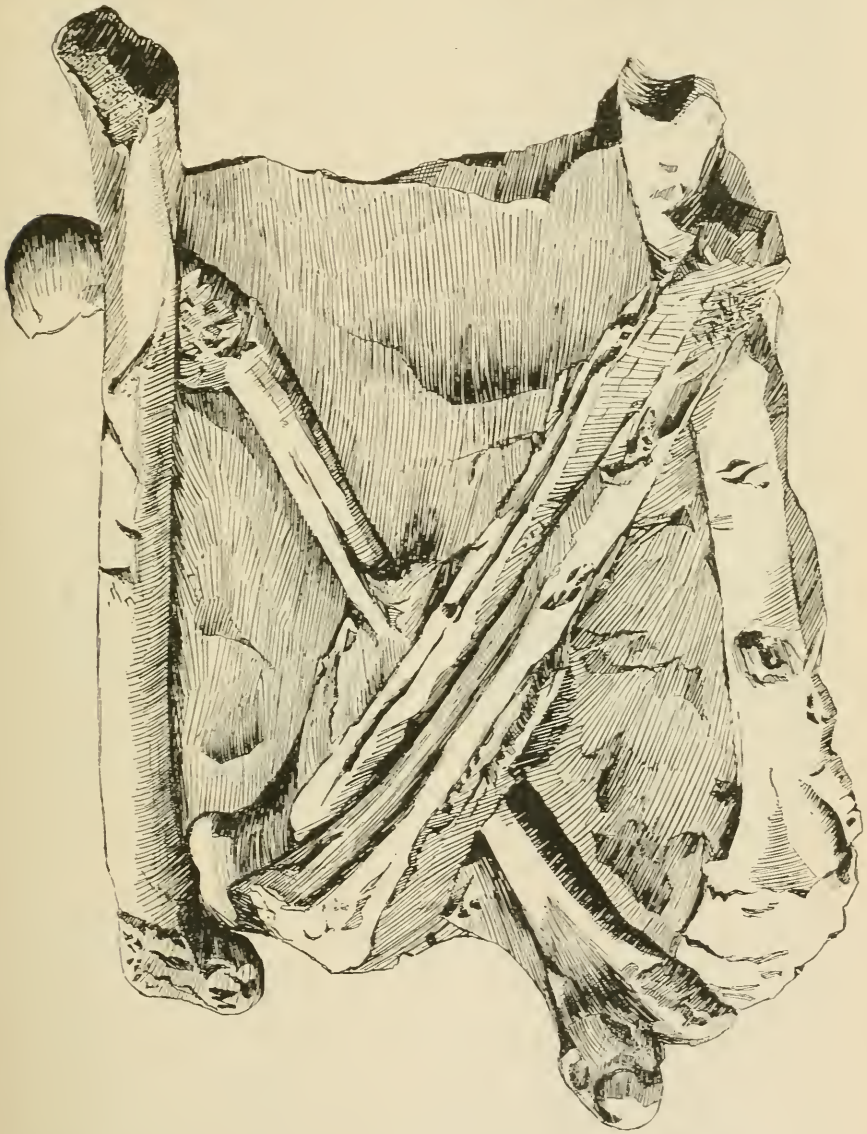


Fig. 17. (22,513). Leg bones as found in Yellow Point Mound.

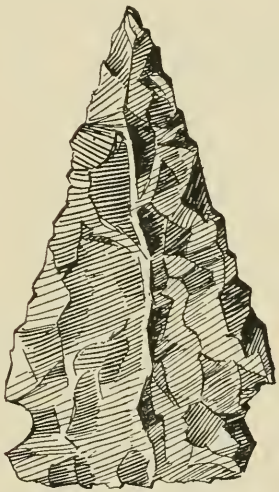
three feet below the surface, we found the sharply-flexed leg bones of a man, and twenty inches north of this, a skull and some arm bones, between which, and near the hands were two roughly made arrow-heads of chert; and below the bones on the left side was a large slate knife or chisel. The positions of the groups were such as to render it a little doubtful whether they had, originally, been

connected, but the probability is that they belonged to the same body. The leg bones were bent as if the body had been found thus, and so buried. See fig. 17. The skull referred to in the other group of bones was the only one we found in anything like a preservable condition, and even it is so fragile that it is held together mainly by earth.

Firmly wedged between the arm bones were two very coarsely-made flints (figs. 18 and 19) and what seems to be an unfinished gorget or a knife of slate, fig. 20.

Between this skull and the eastern edge another body had been buried at full length, with the head to the south, 3 feet below

Fig. 18. (22.506).



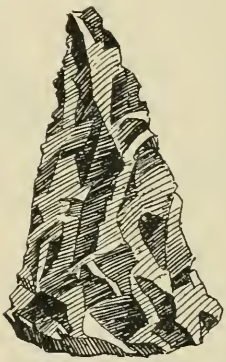


Fig. 19. (22,507).

the surface; and still nearer to the margin were a few bones belonging to another individual, but these seemed to have been disturbed by someone who had made a hole in the mound here.

Perhaps the most interesting part of this mound was the southeast fourth, much of which consisted of burnt earth on a level with the base of the mound. The earth in this condition was near the middle of the southeast section, and covered a circular area eleven feet in diameter, the redness which marked its character being more decided in the form of a ring, about seven and a half feet wide, than it was in the centre, or round the outside.

Near the middle of this space we came on charcoal, and, a little to one side, what was evidently all that remained of a charred stake, (fourteen inches long, and three inches thick), yet standing where it had been driven in, and around the stake were portions of

human bones—skull, arm, leg, and rib—all thoroughly burnt.* Near the stake we found a small and roughly made stone axe. (Fig. 21).

The evidence was almost undoubted that here a living human being had been burned. As the charred wood and bones were on the same level as that on which the bodies were buried, the inference is that the burials and the burning took place simultaneously. It would be useless to offer anything as an explanation respecting

Fig. 20. (22,505).

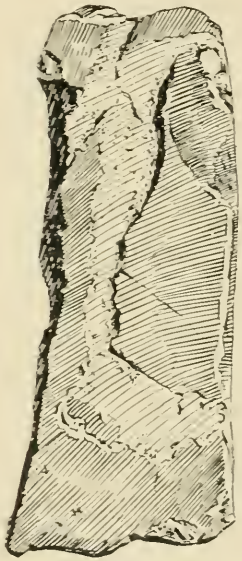


Fig. 21. (22,504).

why this was so, but from what we know of Indian character we are warranted in surmising that an enemy was here tortured by way of retaliation, in full view of the bodies of those, perhaps, whom he or his tribesmen had slain.

This, and the two other mounds already mentioned as being in the same neighborhood, are the only examples of their kind respecting which we possess any knowledge, as far as Niagara peninsula is concerned, with the exception of one already mentioned lying due south, about thirty miles, and close to the shore of Lake Erie.

* In Vol. VI., (facing p. 31) of the Ohio Archæological and Historical Society's Publications, there is an illustration showing how Col. Wm. Crawford was burned at the stake by the Delawares and Wyandots, June 11, 1782. This picture shows the fagots in a ring about twelve feet in diameter round the post to which the prisoner is tied. It was only after seeing this illustration several weeks subsequent to the opening of Yellow Point Mound, that the ring-like appearance of the reddest-earth became understandable.

MOUNDS GENERALLY.

One of the numerous questions that are invariably asked by those who always gather on the spot when the work of opening a mound or on ossuary is going on, is: "How old is it?" and another is, "Who were the people that did this work?" When the work is a mound or embankment of any kind, the question as to the builders usually carries with it an implication that at any rate they were not Indians, so firmly rooted is the belief that another and a greatly superior people preceded those we now call Indians, and that Indians cannot be conceived as capable of sufficient exertion to construct such large earth-heaps, especially when, as in Ohio and some other States, many thousands of tons of earth have been handled in the construction of a single work.

Taking the latter query first, it may be said that the answer is comparatively easy, when the work in question is an ossuary, for we have the best possible authority for the belief that those who dug large pits in which to deposit their dead were of Huron-Iroquois stock, and, secondly, that in point of time no such burial pit, or communal grave, is of more recent origin than the middle of the eighteenth century. How much older than this it may be is a matter of conjecture, based on the condition of the bones, their arrangement or non-arrangement in the pit, the presence or absence of worked objects, and, if any such there are, whether they indicate "white" influence, or the reverse; but when there is nothing to afford any clue as to formation during historic time—nothing of European origin—one can only guess, and guess very vaguely.

When mounds are concerned the case is somewhat different, although a few of them too, have been found to contain objects of European origin, thus enabling an approximate date to be fixed with a degree of certainty. As most frequently happens, however, they contain nothing of this kind, the things inhumed with the bodies (in burial mounds), being wholly of native origin, and closely resembling surface finds of what we believe to have been the work of Indians. The inference, therefore, is that those who constructed the mounds were also Indians, and this is the view now most generally entertained, although it is not quite free from difficulty, respecting which nothing more need be said here. But, in any event, it is absolutely impossible, and, from the nature of the case must always remain impossible, to arrive at anything like assurrance with regard to the date when any pre-historic earthwork was constructed.

If we suppose, as we have a right to do, that the heaping up of mounds for burial and some other purposes had a simple and only slightly significant beginning, as perhaps the marking of a single grave, which itself may have been suggested by the unintentional little hummock that was formed by covering a body with all the earth removed from even a shallow resting-place; or as a result

of laying the remains on the surface, and merely collecting a large enough quantity of earth and stones to cover them; and if we suppose still further, as we are also justified in supposing, that the people so influenced were moving as a body in a given direction, say, southwards, it is only reasonable to conclude that along the line or lines of migration we should find indications of such movement marked by an increase in the size of their earthworks—an increase corresponding to the development of their ideas with respect to the importance of such monuments.

Contrariwise, we may suppose, again, what is equally probable, viz., that in course of time, after the main body of the people had reached a desirable, and, therefore, a somewhat permanent abiding-place, straggling parties would continue to go off in various directions. In some cases those offshoots would cling to their acquired mound-building proclivity, while in others the desire so to mark graves, or to erect works with any other object in view, might be allowed to fall into disuse.

It should also be taken into account that from time to time during the course of such a migration small bodies would detach themselves, preferring not to proceed any farther, or to take a different line of travel, in which case development in certain directions may have ceased, or many have assumed new characters, if, indeed, former knowledge or custom did not even become a thing of the past.

The case, as here put very briefly, is in strict accordance with facts as these pertain to historical peoples: and human instincts, predilections and methods, whether tending to perpetuation, to progress, or to forgetfulness and consequent desuetude, have always been much like what they are among ourselves.

In such conditions, and lacking even a pretence of literature, it will readily be understood how utterly hopeless it is that we shall ever be able either to assign a date to the construction of a mound or to state by whom it was built, and for similar reasons we may see how absurd are the pretensions of writers who claim to classify and designate the purposes of all mounds other than those we know to have been made as places of burial.

In Ontario, mounds and other earthworks are not only comparatively rare and of small extent, but they exist in places widely separated, and we are unable to say positively whether the mounds proper in this Province are the work of the same people who constructed similar works in the northern States, or that they were made by others having no connection with the so-called mound-builders. What seems most likely is that they were the work of some straggling bands from the main body during its southward movement (if it was a southward one), or of some bands which for one reason or another found their way back here shortly after this latitude had been passed, and before the making of huge mounds had become a matter of so much importance, as it afterwards did. Failing this, we can account for our mounds only on

the supposition that the Algonkins, or their predecessors, whoever they may have been, went so far towards imitating their fellows to the south, for notwithstanding the conservatism that is so characteristic of primitive peoples, they are sometimes influenced to a very large extent by the customs and ceremonies of neighboring tribes.

Omitting earthworks or banks, which may have served for protective or defensive purposes, it is noticeable that all the mounds properly so-called in this Province are situated along main water-routes, and this fact of itself lends color to the surmise that they were constructed by a people who were not long occupants of the soil—who were merely moving slowly in a more or less definite course. Otherwise, we might expect to find works of this kind farther inland on the banks of small streams, as in Ohio, Michigan and other States.

It may be mentioned that such mounds as are here referred to (besides those at the mouth of the Twenty Mile Creek) lie along the north shore of Rice Lake and the River Trent,, and the south shore of the Bay of Quinte.

EARTHWORK IN TOWNSHIP OF MOORE.

Dr. T. G. Johnston, M.P., for West Lambton, having directed the attention of the Department to the existence of a large earthwork within a few miles of Sarnia, I was directed by the Minister of Education to visit the place and make an examination of it. In company, therefore, with the genial doctor, who is deeply interested in our Provincial archaeology, and possesses a small collection of excellent specimens, I reached lot No. 26, on the 11th concession of Moore, when a short walk through the woods brought us to a large, oval earthwork, the area of which is sparsely covered with small trees, all the enormous red oak, for which this portion of the Province was so famous, having been cut down in the early days of settlement for the making of potash, or "black salts," or, more recently, for timber.

We soon ascertained that the longer axis of the ancient enclosure was in a northerly and southerly direction, and with the assistance of Mr. John Miller, who resides not far away, we made a number of measurements, but ascertaining after our return to Sarnia, that Mr. Alfred Willson, Manager of the Canada Company, was in town, and as he had formerly suggested an examination of the embankment, he now kindly consented to accompany me on another visit to it, when his professional services as a civil engineer were freely given in the making of a more exact survey than Dr. Johnston and I had been able to accomplish. To Mr. Willson also we are indebted for the drawing of the earthwork, which is here reproduced.

The land on which the work has been constructed is as level as is all the land in this part of Ontario, and this means that it is

almost a dead level. Measured from crown to crown of the bank, the diameters are 330 feet, and 176 feet. All, or most

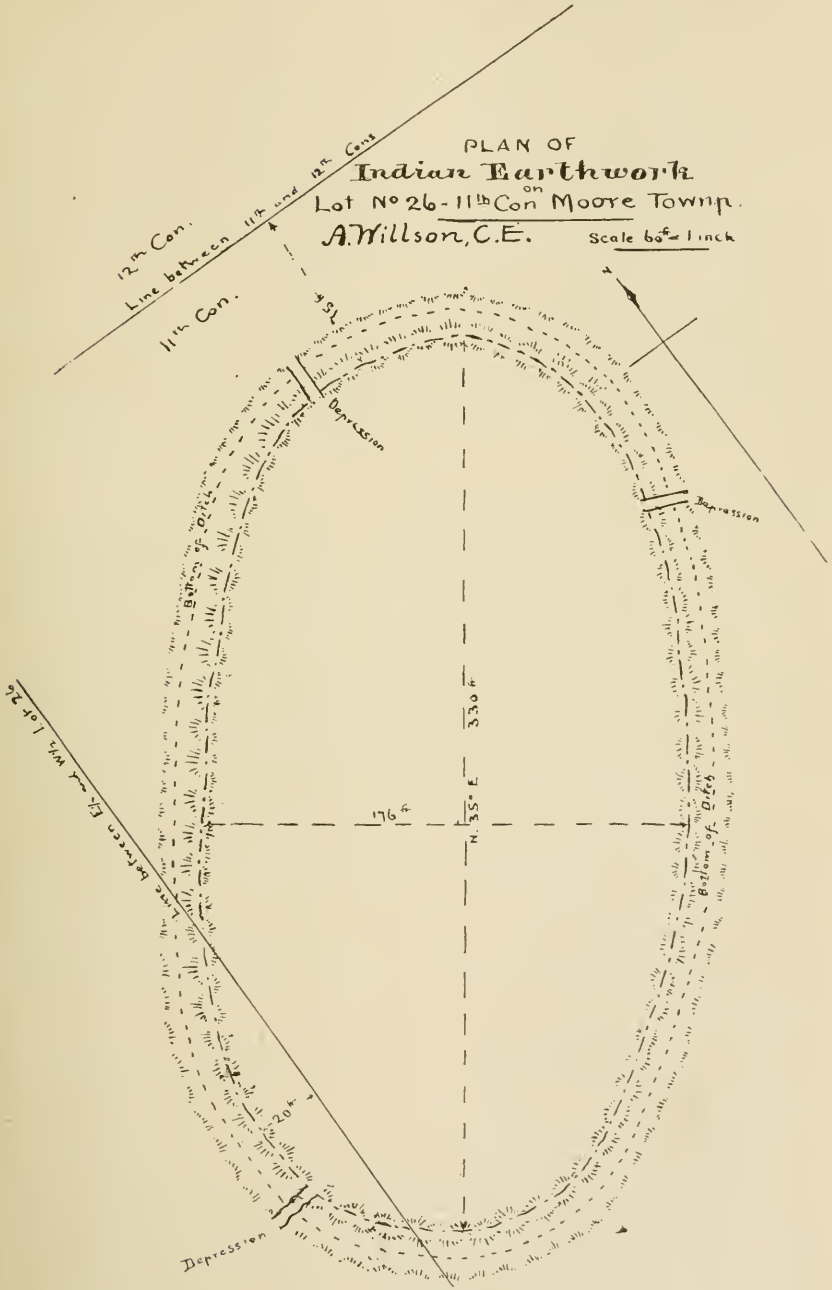


Fig. 22.

of the earth has been taken from the outside of the bank, and close to the base, where the greater part of the material has been removed.

there is a shallow ditch from ten to twelve inches deep, and varying in width from three to four feet. From the bottom of this ditch to the level of the top of the bank, the greatest height was found to be barely three feet, but the average is under two and a half feet, while the width of the bank at the base is from eighteen to twenty feet. At one place, near the southerly end, towards the west side, and at two places near the northerly end, there are depressions, but it is not easy to say whether these formed part of the plan, or are the result of washouts, or are passages recently made either to haul out timber, or as a result of hauling it out. The embankment is too low to have rendered any such means of entrance necessary, but if the enclosure was palisaded, as seems probable, these depressions might have been worn down at gateways.

Otherwise than for defensive purposes it is difficult to conceive of any reason for the existence of such an embankment, which, after all, was only what served to support one or more rows of stakes, or palisades, for, it may be noted, that instead of digging holes to receive the posts, these were most likely placed in order on the surface of the ground, after which the earth was scraped up and heaped about them to a height of two or three feet.

At present there does not appear to have been any water-supply for the use of those who occupied the place, but when the country was in "bush" it was not necessary to go more than two or three feet deep to find water almost anywhere in this district.

The distance of the earthwork from the River St. Clair is a little more than two miles in a straight line west, and, with our eyes, it is very hard, if not quite impossible, to surmise any reason for this choice of position. About three-fourths of a mile northward a small stream flows sluggishly to the river, and no doubt this stream was navigable for canoes when the country was forest-clad. By this route access to the place would prove comparatively easy to those who knew the way, while its distance from the river, in the heart of the bush, must have rendered it somewhat difficult for any others to reach. But for the existence of the stream referred to there does not appear to be any reason at all why the earthwork should have been constructed where it is, rather than anywhere else in a stretch of many miles north and south.

With some time and labor it would be possible to expose traces of the posts or stakes that once stood in the embankment, for even although none of the wood may remain, a careful slicing of the sod to a depth of from two to four inches will probably result in showing circular patches of darkly colored earth, marking where the posts were planted, the darkness of color being on account of the humus formed by the decay of vegetable matter in the holes, while the posts themselvs slowly crumbled. This, at any rate, may be done where the soil is light in color, but in the Township of Moore the general dark color of the soil to a considerable depth may make such an examination less easy.

Within the area of the embankment there are no surface indications of residence such as marks where houses have stood, and the spade failed to show any signs of ashes in the various places where holes were made.

With the exception of a small stone pipe, fortunately found by Dr. Johnston, very few relics have come from the enclosure or its vicinity.

As in the case of the Southwold earthwork, and in that of the Otonabee Serpent Mound, it is very desirable that steps should be taken to preserve this interesting example of early Indian occupation, and we can only hope that Mr. Henry Hossie, the owner of the land on which the Moore earthwork is situated, will continue to preserve it from demolition. Some of us may live to see the time when provision will be made by law to prevent the destruction or removal of such ancient landmarks, as in some other countries.

In Mexico the law prohibits even the removal of aboriginal relics from the country without the consent of the Government.

REPORT UPON A SUPPOSED ABORIGINAL FISH-WEIR IN BURGESS LAKE, NEAR DRUMBO, ONTARIO.

By W. J. Wintemberg.

In the fall of 1898, Mr. Rathbun of Drumbo informed me of the discovery of some stakes in the bottom of Burgess Lake, which, he believed, had been placed there by the aborigines. Upon inquiry it was found that none of the old settlers knew of their existence; it was only after the lake had been drained that they were discovered.

Not having seen a similar structure before, I hastily concluded that it might have been the work of some early white trapper, but a subsequent examination of the ends of the stakes, convinced me that it was not the work of a white man, for, even if provided with only a dull iron axe, he would have succeeded in making the ends of the stakes more pointed. Moreover, of what possible use could the structure have been to a white man? The only suggestion I have to offer in regard to the use of the structure is that it is the remains of a fish weir, but this identification is to be regarded as provisional only.

It is a well-known fact that the Indian tribes of the Atlantic coast region made use of fish-weirs. Capt. John Smith records their use among the aborigines of Virginia. In Thomas Hariot's "History of Virginia,"* and in Robert Beverley's "Virginia,"** a number of plates are given in which they are delineated. Several years ago, Dr. H. T. Cresson discovered some stumps of stakes in

* Plates vi., vii., xiii. and xvii. Two kinds are shown in Plate xiii.

** "The History of Virginia," in four parts: (London, 1792), p. 130.

Naaman's Creek, Delaware,* which are supposed to have been the remains of such a structure; but these, according to Prof. W. H. Holmes, (x) "appear to be much heavier than would have been used for the purpose by the natives." There are only two recorded instances of the occurrence of fish-weirs in Canada. Several fish-stakes were found some years ago at the Narrows, Lake Couchiching.‖ In H. Y. Hind's Report (p. 83), J. Fleming records a weir built by Indians across the Jackfish River near Lake Winnipeg.

The Burgess Lake structure consists of two parallel rows of tamarack stakes, which pursue a northeasterly course for a distance of about 52 feet, and then make an abrupt turn to the east, and

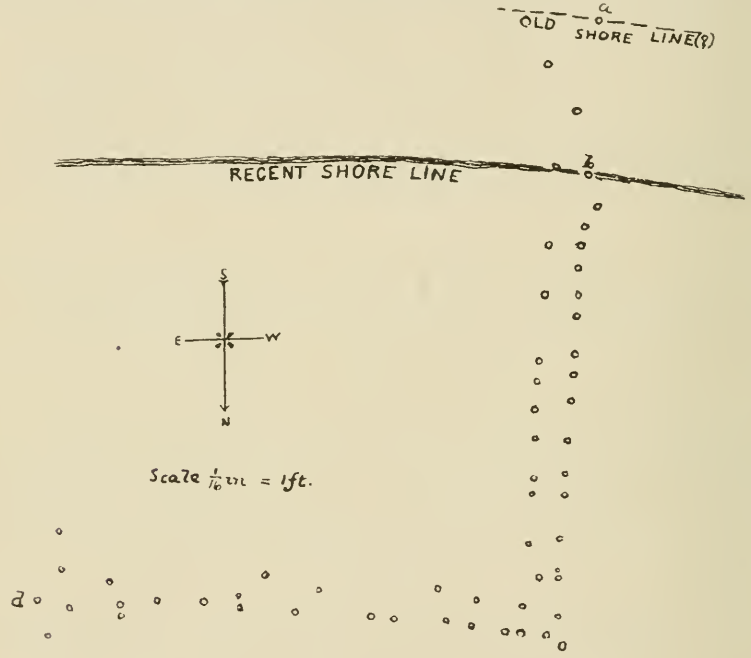


Fig. 23.

extend for another 42 feet, to d. See fig. 23. From here, apparently, they at one time extended to the eastern shore of the lake, for, there, 280 feet from d, ten other stakes were found. The figure shows the arrangement of the stakes. The natural outlet was near a ditch. The shore line east of this ditch has been destroyed by cultivation.

The rows, in some places, are from 16 to 40 inches apart, but the general width is 30 inches. This is also the average distance

* "Report upon Pile Structures in Naaman's Creek, near Claymont, Delaware," by Hilborn T. Cresson (Archæological and Ethnological Papers of the Peabody Museum: Vol. I., No. 4): Cambridge, Mass., 1892.

(x) "Prehistoric Textile Art," in the 13th Annual Report of the Bureau of American Ethnology; pp. 14-15.

‖ *Vide* General Clark's Paper "A Study of the Word Toronto," in the Archæological Report for 1899, pp. 195-196. Also "The Canadian Indian." (Sault Ste. Marie), Vol. I., 1890-91.

between the stakes of each row. The stakes are from 2 to 3½ inches in diameter, and their length is about 6 feet. Nearly 10 inches protruded above the bed of the lake at the time of discovery, and this exposure was, no doubt, due to the partial subsidence of the muck composing the lake-bed. Eighty stakes were then counted, but many have since been removed and only about fifty remain. Mr. Rathbun found three or four stakes buried in the bog recently forming the shore, and this proves beyond a doubt that the sphagnous growth has made an encroachment of nearly 13 feet since the structure was formed. Mr. Rathbun also examined the west and north shores of the lake, but failed to find any more stakes.

The stakes were not sharpened by cutting toward the end, but the ends were split and reduced to a point by sripping off small pieces. This splitting could have been done with a stone axe. I have one stake which appears to have been partly cut through and then broken off. No attempt was made to sharpen it, and the axe marks may still be seen. Many of those examined by Mr. Rathbun were "broomed" at the ends—possibly the result of persistent hacking with a stone axe.

It is difficult to explain the purpose of the two rows of stakes. The aborigines would scarcely go to the trouble of wattling two rows when one would serve the purpose just as well. It has been suggested that possibly "brush" was piled in between the two rows until an almost solid wall was formed. This would have served as an effective bar against the passage of fish, but perhaps those who think of "brush," fail to realize how difficult it would be to make it sink. The shallowness of the stakes, precludes all possibility of there ever having been the remains of a pile-dwelling, as some think and this is further proved by the parallel arrangement of the stakes.

At a depth of from four to five feet is a bed of hard clay, on which the points of the stakes rest. The depth of the water at this place was two feet, and this explains why the stakes were never seen.*

The ichthyan fauna of the lake may have been more extensive in prehistoric times, but the following is a complete list of the species inhabiting the lake before it was drained :—

Catfish (Amiurus nebulosus).
Black Bass (Micropterus dolomein).
Yellow Perch (Perca flavescens).
Sunfish (Lepomis gibbosus).
Large Sucker (Minytrema melanops).
Small Sucker (Erimyzon succeta).
Horn Chub (Semotilus atromaculatus).
Silver Chub (S. bullaris).
Shiner (Notropis megalops).

* Mr. Rathbun says he has often passed over the spot in a boat, but never saw them.

Few would be of much economic importance to us, but, we may presume that to the Indians, simple in their tastes, nearly all, or even all, of these fish would have been of some use as food; and possibly their presence and difficulty of capture by other means led to the construction of the weir.

INDIAN OCCUPATION IN NISSOURI.

By L. D. Brown.

All who are interested in the research which is being made into the history of the aborigines of this country will mark the great progress made in this direction during the last decade. At the present time, when men are bending every energy to collect and preserve, implements of war, ornamental, religious or ceremonial objects, and also to gain information as to the mode of dress, living and daily occupation of a prehistoric race, it becomes the duty of every individual who may possess the knowledge, and also of the Government, to do all that is possible to aid and further such research. We are pleased to know that the Government has taken such an interest, and has established a museum in connection with the Education Department in Toronto, which is destined to be one of the city's chief attractions. The museum has in its cabinets a very large collection of stone implements, flints, slate, copper, bone, shells and pottery, including many articles of domestic use among the savages. There is also a large collection of crania of the different tribes of Indians who formerly peopled this country. Some of the implements are rough, while others exhibit great skill. Besides these, there is a large number of iron tomahawks of various patterns, which mark the advent of European civilization. These specimens are properly arranged in handsome cases. Many townships and counties in the Province yield abundant proof of busy human life in the dim past, and, knowing that the Township of East Nissouri, in the County of Oxford, was peopled by savages, and was the scene of active life, we have spent much time during the past three years in search of specimens, and locating old camp sites. We feel justified in saying that we have located at least three Indian settlements, or villages in the township. The first one of which we will speak is the village at Lakeside. The lake is a beautiful sheet of water, covering an area of about one hundred acres, and is divided by the 12th concession line, part of it being on the east half of lot 24, and part in the west half of lot 24 in the 13th concession. On the west side are bluffs, while on the south is a swamp or huckleberry marsh, which forms an outlet. The camp sites are on the east and west sides, being on lots 23, 24, 25 and 26, as may be seen by the accompanying diagram. These camps are over 30 in number, and vary in size from eight rods to 50 in length. They are, as a rule, either oblong or round, and would accommodate from 10 to 50 persons, providing the lodges were built on the plan we

imagine; that is to say, the outer edge of the lodge would be at least eight feet from the fire. We conclude that their lodges were built of bark, the place chosen for a camp site being where small trees could be used to support the framework. In building, the bark would be placed around the camp fire, something in the shape of a dome, with a portable door, and a large aperture for the smoke to escape. This theory must be reasonable, from the fact that the Indian could not pass the winter of Ontario without shelter of some

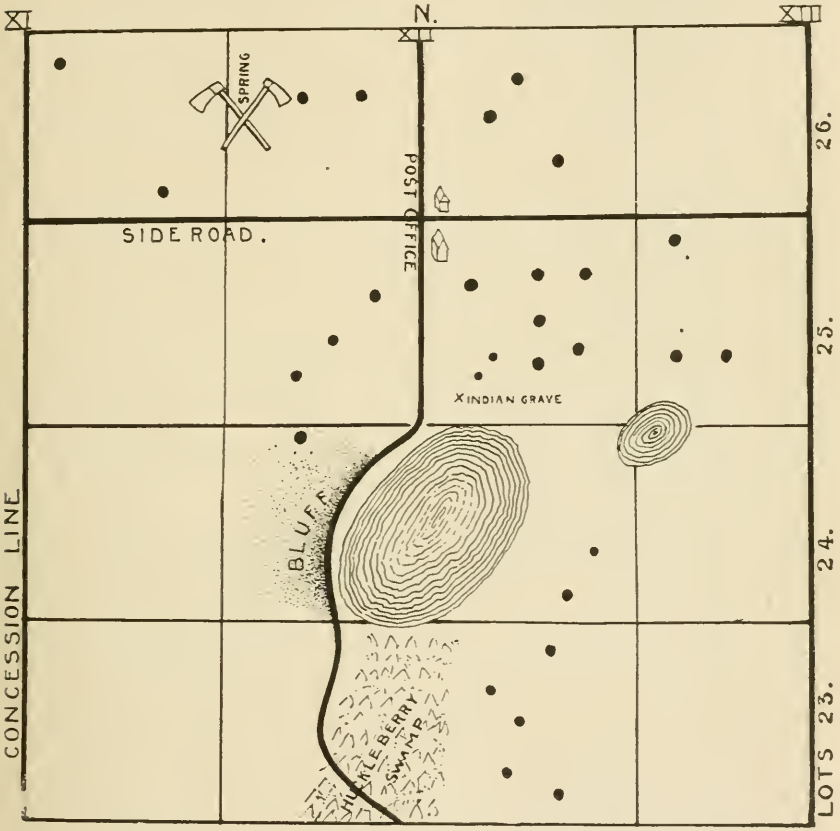


Fig. 24. Indian Village Sites, near Lakeside.

kind, either in the way we have described, or a dug-out, and as we have no evidence of the latter, we are forced to the conclusion that it was constructed of bark, as we have found stone implements which appear specially adapted for the purpose of removing bark from trees. It would be proper to mention, at this point, that another small lake lies about a quarter of a mile to the northeast and covers an area of about 30 acres, being situated at the back of lots 24 and 25, in the 13th concession, as will be observed in the diagram. The camps, with very few exceptions, are on a sloping hillside, facing a stream or ravine. In the interest we have taken in the aboriginal history of Nissouri we have located the situation

of the red man's humble dwelling, and we find that he chose some elevated spot along the banks of a stream or river, which was his only highway, and which guided his preregrinations from place to place. In this respect he was not unlike his white brother in his choice of location of a habitation. Almost without exception the early settlers of the country erected their log-cabins on some elevated spot, near the road, on the lot which they had taken up. We conclude from observation that the Indians constructed their camp fires by excavating the ground to a suitable depth. The stone being procured, we assume it was placed in position something after the order of paving. On these hearthstones, the fires were built, which gave, both light and heat to the inmates, and, after the fires had gone down, the heat of these stones would keep the place comfortably warm for many hours. These stones, being freed from ashes, while still hot, would afford good opportunity to roast flesh, and would serve to dry strips of meat which were suspended from the roof of the wigwam, for future use. The stones by continued use became broken into small pieces, and it was necessary to repave the fireplace. This may have been done two or three times, as the broken stone were found to be from eighteen inches to three feet in depth. The absence of wood ashes among the stone was somewhat remarkable. The stone is imbedded in a sooty substance composed of what appears to be earth and powdered charcoal. These remain black in any soil, though the land may have been worked for more than half a century.

Unlike the camp fires in other places, where wood ashes are found, these yield nothing to the relic-hunter, but around them hundreds of stone celts or axes have been found, and thousands of arrow and spear heads of all descriptions, flint drills, with slate gorgets of different patterns of Huronian and other slates. The only pipes found were at Lakeside. Those having first attracted attention were picked up, laid aside, and either lost or carried away, as well as some of the finest specimens of gorgets; while the axe and arrows were until within the last few years regarded as worthless. Small fragments of pottery were found on the east side of the lake, and two broken amulets, the head of one resembling a wild goose. Iron tomahawks are not abundant in Nissouri, as about twelve will cover the number as far as we know. One of these was found by Henry Craig, some fifty years ago, on the 11th concession, not far from Lakeside. It had been thrown into a tree about a foot from the ground, and was almost grown over, only a small portion of the poll being exposed. Charles N. Mitchell of lot 25, whose farm is on the shore of the lake, gave us valuable assistance in locating old camp sites, a number of which are found on his farm. Mr. Mitchell has a good collection of Indian relics. There are also camp sites on lot 26, the farm of Frank Seaton, who also gave assistance. Mr. Israel Mead spent some time with us, locating camps. The arrow and spear heads found around Lakeside have a rusty appearance when compared with others found in the township,

which gives the impression of greater antiquity. However, we attribute this to the sandy soil on the lake shore.

At settlement No. 2 the same class of weapons was found. the centre of the settlement being near Kintore on Armstrong Creek, between lots 13 and 14, in the 11th concession. Other camp sites may be found as far south as lot 11, and on the north side as high as lot 17. This may include from 10 to 15 camps. Within this area hundreds of specimens have been found, among these a spear head over seven inches in length, perfect, and of a beautiful design; also a tube of Huronian slate, and a red slate spear head highly polished. These were found on the farm of Thomas Pearson, lot 14, and not far from here on the Potter farm, lot 17, a spear head of quartz between four and five inches in length, remarkably white and clear, was picked up. Settlement No. 3, at the junction of McKay's and Purdy's Creek, lots 24 and 25, may be considered its centre. The other camps extend for some distance north and south, along the banks of the creek. Within what might be considered the bounds of this settlement the usual number of stone axes or celts, with slate gorgets, arrow tips, and spear heads, also three iron tomahawks, have been found. Special mention may be made of a fine specimen, a gouge picked up by Carman Brown on lot 25, also a gorget of Huronian slate from the farm of Mr. Alex. McKay. A banner stone of a dark green color was found by Fergus McMaster on his farm on the 7th concession. It was of the butterfly pattern: on the upper edge were twenty distinct marks, while on the lower edge of the reverse side we counted 26. Our first idea was that this represented a record of events. However, those marks so closely resemble those on pottery, we concluded that they were simply ornamental. Perhaps no greater variety of spear heads and arrow tips has been found in Ontario than in the bounds of these settlements. Occasional isolated camps are found, which make between 50 and 60 now located. The food supply at Lakeside was an abundance of chestnuts and huckleberries, while the lake abounded with catfish. At settlement No. 2, on Armstrong's Creek, could be had wild apples and large quantities of grapes and black cherries. At settlement No. 3, along the flats, butternuts, wild plums and other small fruits were found in great profusion. We might here mention that at settlements No. 2 and 3 several beaver dams were found. These, along with a plentiful supply of other game, made this a favorite camping-ground. There is no evidence that the Indians of Nissouri ever cultivated the soil. There are six private collections of Indian curiosities in Nissouri, the greater number of the relics having been picked up during the last few years, and would number about fifteen hundred specimens. The question is at what period were those villages inhabited. In 1640 this country was inhabited by the Neutral Indians. Parkman thus describes this warlike tribe: "In their athletic proportions, the ferocity of their manners, and the extravagance of their superstitions, no American tribe has ever exceeded them."

The Jesuit fathers, Brebeuf and Chaumonot, visited the Neutral Indians about the middle of the 16th century, and it is quite possible they were at the Lakeside village. The only evidence was a bronze medal and spoon found on the skeleton of an Indian in a shallow grave on the shore of the lake at Lakeside, some forty years ago, which were both, unfortunately, lost. However, it is evident that the fathers, as well as very early French traders, ascended both the north and south branches of the Thames in the Township of Nissouri. On the south branch of the Thames was found a bronze tomahawk of a beautiful design. This was ten miles from Lakeside, on the farm of Walter Freel. A theory has been advanced that this was one of the hatchets which the Hurons gave the Neutrals to induce them to put the Jesuit fathers to death. On the north branch of the Thames, Robert Elliott, an enthusiastic collector, picked up an old French knife on the bank of the river at Plover Mills. Since then another has come into his possession, found near this point, which was originally a far superior weapon, being when open nine inches in length. The point of the blade is formed like a dagger; the handle has every appearance of having been at one time handsomely mounted.

He has also a French tomahawk, found near this place. These all bear evidence of great age. It was but a short distance from this place that Mr. Chris. Switzer ploughed up an old hatchet. The bit is five inches in width, a chain-like mark runs round the poll, while one side of it bears an Imperial stamp. This is supposed to be of British manufacture, and was found about fifty years ago. Long after the Neutrals had been driven out of this country fragments of wandering tribes were found here by the early settlers, roving from place to place. We are indebted to Mr. Robert Garner, a pioneer of West Nissouri, for a description of an Indian burial on the north branch of the Thames, about 1830. There were about 25 Indians present. The body was placed in a coffin made of bark, from which the rough outer bark had been removed. The head of the coffin was either oval or square, while the foot was wedge-shaped, something in the form of a canoe. The pieces were sewed together with strips of hickory bark. The lid was also of bark, and fitted neatly. When complete it was an admirable piece of workmanship. Along with the body in the coffin they placed a bow and arrow, tomahawk, and some trinkets. The shallow grave in which the body was placed was then filled in, after which they cut small white poplar poles, about six feet in length which were laid on each side of the grave, and were connected on the notch and saddle plan by shorter poles, at the head and foot. The ends were in the form of a gable, while each round of side poles was gradually drawn in, until one pole formed the ridge, the whole forming a complete roof. Mr. Garner says when complete it was picturesque. We are also indebted to Miss Fanny Reid of Zorra for a description of an Indian burial on the same plan as the former. However, in this case we think the poles were of peeled cedar or tamarack. This took

place near Harrington, and an account of it was given to Miss Reid by her father, one of West Zorra's earliest pioneers. The finding of Indian remains may not be so rare, as individuals who have found skeletons never mention it unless in connection with a subject of this kind. It is believed by Dr. Sparks and other that numbers of Indian graves may be around Lakeside, as the one described was found by accident. An early writer describes the disposition of their infant dead. They were placed in little birchen caskets and set among the flags on the margin of some inland lake.

Picture Writing.—In speaking of the Indian, we might here relate a story told us by a gentleman who traded with the Indians many years ago. After purchasing furs, he and his partner made arangements to trade again with them at some future time. However, during the period which intervened, the Indians had occasion to break up their camp. The traders, on coming to the old camp, found it deserted. On examination they saw on the smooth bark of the trees pictures of Indians and ponies, heading in a certain direction. They at once surmised that these sketches were to be their guide to the new camp, and, following these signs for many miles, came upon the new camping-ground.

An instance of fidelity on the part of the Indian is given by Andrew Logan, who was born in West Nissouri. He relates an incident of a few wandering Indians coming to his father's cabin for food and shelter. His father treated them kindly, and relieved their necessity. They disappeared as silently as they came. In after years, Andrew struck out to see the world. Arriving in Buffalo, where he hired to a lumberman running timber through the Erie Canal from Buffalo to the Hudson River. On one occasion, being delayed, he, with others, resolved on taking a run down the river and seeing New York. As he was passing up one of the streets of the great city he was surprised at meeting an Indian, who called him by name. Mr. Logan was fairly nonplussed. When the Indian explained how he had stayed at his father's cabin in Nissouri. The Indian insisted that he should go with him to see some rich friends of his, where he might return the kindness he had received at the cabin in Nissouri. Mr. Logan explained that this would be quite inconvenient, as he would have to return with the other men that evening. Many more incidents of Indian characteristics might be related by the early settlers in the Township, and when the wooded pastured lands along the banks of streams and rivers are cultivated, much valuable information may be obtained of early Indian occupation in Nissouri.

Note.—Since writing a description of the Indian settlements in Nissouri several more camp-fires have been found, also two tomahawks not more than six feet apart, near a spring not far from the lake as seen in the diagram. Flint spear-heads and arrow-tips are found of different patterns and varied shades from mixed lime-stone to the most beautiful semi-transparent specimens with an occasional specimen of light quartz or dark grey stone. The writer has on loan, a specimen of Huronian slate in the form of a straight pick-axe. One side is marred by a small crevice. When this specimen was found the crevice was filled with the same dark substance found in the fire camps though found in clay loam a mile distant from any camp site. As far as I have examined there are no indications that the Indian who occupied this territory ever tilled the soil.

ANIMAL REMAINS FOUND ON INDIAN VILLAGE SITES.

By Dr. Wm. Brodie.

The following list of animal remains found on prehistoric Indian village sites, is based largely on personal researches over ten such sites situated in the county of York and the township of Pickering, extending over half a century, for it was in the summer of 1846 I first made the acquaintance of two of these sites, then covered with original forest, untouched by the axe of the settler. All of these Indian village sites, except three, are now in cultivated fields, and most of them have been ploughed and harrowed for a quarter of a century and every square yard of their area has been dug over by relic-hunters several times; but still every ploughing brings specimens of interest to the archaeologist. This and the blackened soil, from decayed animal and plant matter, testify to the long occupancy of these sites as human dwelling places.

Repeated ploughings and harrowings have broken the skulls and the bones of birds and small mammals into minute fragments. The lapse of time also has caused the decay of the small and soft bones. For it is not likely that any of these sites were occupied by Indians after the massacre by the Iroquois.

The first time that I saw the old fort in Whitchurch, in 1846, there were red oak and maple trees from 18 to 24 inches in diameter, growing in the bottom of the ditch, and on the top of the embankment, and on the area; enclosed by the palisade were a number of large pine trees, forking at the base into a number of trunks.

No doubt these trees were growing when the place was occupied by the Indians, and were mutilated by them. Several of the stumps of these pines are still in good preservation. These could be sawed off and a date computed from them.

Both land and fresh-water shells were roasted on burning coals. This caused the foot to protrude, when the animal was pulled out and eaten in the same way as whelks. This partial calcining of the shells accounts for their fragile character, readily crumbling into powder.

The only bones of fish found were sections of the backbone, which had been worn as beads, or ornaments of some kind.

The skulls of mammals were invariably broken, to get out the brains which were used in tanning skins and for other purposes. In all my searchings I never found the skull of any animal entire; but these broken skulls supplied much material for specific identification. The long bones of mammals, both large and small, were broken to get out the marrow.

The breaking appears to have been done by striking the bones with a stone mallet, in such a way as to make an elongated fracture, so that the marrow could be readily got out, and cutting or boring tools shaped from the broken pieces; so, in almost every case identi-

fication was from the heads of the bones, which in most cases were unbroken.

In two of the midden heaps I found human bones which had been broken as the other animal bones were, strongly suggestive of cannibalism. To say that a ton of archaeological material was collected from the County of York sites, is a moderate estimate.

Some of it is in European museums, some in the States, and some of it in Laval University, some is still in the hands of amateur collectors, and a little of it has been secured for the Provincial Museum: but the greater part of it, once in the keeping of private collectors, is gone, being neglected and lost, as private collections often are.

MOLLUSCA.

Anadon footiana.

Partially calcined fragments of Anadons were more or less common in all the midden heaps examined, a few of the more perfect doubtfully referred to this species. Several species of Anadon are common throughout Ontario in still waters, having muddy bottoms. The Anadon shells are more fragile than the Unios and are not so durable. They are usually found in shallow water, and no doubt supplied the Indians with a large amount of food.

Margaritana rugosa.

Several worn and polished pieces of this shell from Old Fort Whitchurch were evidently used as cutting or scraping tools.

M. rugosa is the most ponderous of our Unionidae, and does not occur in the York County. The specimens may have been brought from tributaries of the Grand River.

Unio pressus.

Partially calcined fragments of this shell were more or less abundant in all the village sites over the northern part of York. Several fairly well-preserved pieces of valves were picked up, no doubt used as tools of some kind, easily identified as of this species. In the early years of the last century this species abounded in the upper tributaries of the Humber, the Don and the Rouge. Being found in shallow rapids, they were easily collected, and no doubt formed a staple article of food. In some of the small streams this shell is still found, having held its place against the inroads of civilization.

Unio luteolus.

Partially calcined fragments, doubtfully referred to this species. U. luteolus is a common shell over the southern and central parts of Ontario in lakes and slow-running streams, in water from one to six feet in depth.

Unio complanatus.

Common in all the debris heaps, usually in partially calcined fragments. A few valves have been picked up nearly entire, the hinges rubbed off and polished, the edges sharpened, evidently used as cutting or scraping tools. This is now the most common Unio in the Province, occurring in lakes, ponds and slow-running streams everywhere.

Paludina decisa.

A few specimens fairly well preserved, pierced through the aperture, well within the edge of the lip. No doubt used as ornaments.

This species is generally distributed through Ontario on the sandy shores of lakes and sluggish streams. When young this is a pretty shell, the epidermis is well polished and of variegated greyish green colors, this and its durable quality, no doubt, made it a favorite ornament of the Indian women.

Melania livescens.

This durable and graceful little shell was found in most of the debris heaps, searched over, and it would seem to have been a favorite piece of jewelry. A few specimens, very well preserved, and pierced for the passing of a string, probably water worn specimens, picked up from lake shores, now commonly found in shallow water.

Limnea stagnalis

Many partially calcined fragments doubtfully referred to this species, a few in which identification was more certain.

L. stagnalis is the largest of our univalves. The shell is too thin and fragile to be of any value as cutting tools, but no doubt this species supplied a large amount of food. It is abundant, widely distributed and easily collected.

Limnea modicellus.

A few fragments referred to this beautiful species in debris heaps to the north of the height of land. Now rare in tributaries of Lake Simcoe.

Limnea palustris.

Partially calcined fragments abundant. A few well preserved specimens, worn and polished, with holes within the lip, have been picked up. A common shell in all our shallow waters.

Physa heterostropha.

Many small fragments of doubtful identification, a few pieces of the body whorl, with the lip perfect, have been picked up. The shell of this very pretty species was used as an ornament, and this with a species of Succinea were doubtless used as food. P. heterostropha is common in shallow ponds and in lagoons rich in aquatic vegetation.

Planorbis trivolvis.

Abundance of partially calcined fragments in all the midden heaps, a few fairly-well preserved specimens rubbed smooth and polished by long use as ornaments. This widely distributed species is common in ponds and sluggish streams.

Planorbis bicarinatus.

Found in the same localities and in the same condition as is the last. More or less abundant in shallow waters throughout the Province.

Helix palliata.

A few broken pieces of this handsome shell, showing the wide lip and peculiar armature of the aperture, polished by long use as an ornament. This species is found in damp forests and cedar swamps, rarely in open fields.

Helix monodon.

A few broken pieces of this pretty little shell. One from Old Fort Whitchurch, in which a hole had been made through the centre of the spire.

Helix albolabris.

Many small fragments, doubtfully referred to this species. A few in which the lip is more or less perfect and identified with a good deal of certainty. This is the most common of all our air breathing shells.

VERTEBRATES.

Fish.

Salmo salar—Salmon.

Sections of the vertebra of this species or of the next, for there is scarcely an appreciable difference between the bones of the two, have been found in most of the debris heaps very well preserved, rubbed smooth and polished by long use as ornaments. The specimens were evidently from large fish, probably weighing over fifty pounds.

The Indians killed salmon while ascending the smaller streams in the spawning season. This was a favorite method of capture, practised by the early settlers in the County of York, as well as Indians.

I have heard old men tell of having speared salmon in the upper tributaries of the Rouge, where they cross the townline between Markham and Whitchurch.

Salmo namaycush—Salmon Trout.

Section of vertebra doubtfully referred to this species. This species not ascending streams to spawn, was not so easily taken as the last. No doubt brook trout, suckers and smaller species of fish usually found in shallow rivulets, were taken and eaten by the Indians, but no trace of them has been found.

Reptiles.

Chelydra serpentina—Snapping Turtle.

Pieces of the shell made into implements, the purpose of which is not very well known. Several more or less perfect femurs. These peculiar bones were used for such purpose, being well polished. A fragment of the skull of what must have been a very large specimen, found in a midden heap on the banks of the Humber.

Chrysemys picta—Mud Turtle.

A few pieces of the shell perforated with holes in the usual way and abroken femur, probably of this species. C. picta is the most common mud turtle in the County of York, in millponds, lakes and sluggish streams.

Birds.

Bones of small birds, ducks and others, were abundant in all the village sites, too much broken and decayed for specific identification, pieces about two inches in length, cut from the middle of the bone, both ends gone, were common and well preserved, polished by long use as ornaments, but identification, except in a few cases, impossible.

The only bones of birds which were recognizable were tarsi, humeri and ulni. Hundreds of specimens were examined without finding one perfect enough for identification.

Ardea herodias—Great Blue Heron.

Tarsi, commonly called leg bones, shaped into various implements, as also humeri and ulni wing bones.

Meleagris gallipavo—Wild Turkey.

Two tarsi both shaped into sharp pointed instruments, for piercing, commonly called needles. The condyles articulating with the phalanges were perfect. Another tarsus, probably belonging to this species, had apparently been used as the stem of a pipe. These were found on the site on lot 9, con. 8, Township of Whitchurch.

Pandion haliaetus carolinensis—Fish Hawk.

One tarsus found in a grave with the bones of a young person. This peculiar bone was polished and well preserved, doubtless worn as an ornament by passing a string through the osseous tender-loop.

RODENTS.

Lepus americana—Wild Rabbit.

Numerous fragments of skulls, usually retaining the superior molars, also pieces of lower jaws. None of the other bones could be identified as belonging to this species.

This species, always abundant in forests, especially so in cedar swamps and being easily trapped, especially in winter, no doubt afforded a large supply of food.

Erethizon dorsata—Porcupine

Broken skulls, usually retaining the molar teeth, more or less common in all the sites. Several femurs, one perfect, polished by long use, probably worn as an ornament, also incisor teeth not uncommon.

Fiber zibethicus—Musk Rat.

Broken skulls, usually retaining the molar teeth, found in all the sites. Broken lower jaws and loose incisor teeth common.

Castor fiber—Beaver.

Broken skulls, lower jaws, incisor teeth, abundant in all the sites, a few under incisors with holes towards the root end, one having a notch near the middle.

Arctomys monax—Ground Hog.

Broken skulls, now uncommon, more especially in the southern sites.

Sciurus carolinensis—Black Squirrel.

A few broken and badly preserved skulls of a sciurus, doubtfully referred to this species. Formerly the most common squirrel in the forests of Ontario.

Sciurus hudsonius—Red Squirrel.

Skulls broken in the usual way, incisor teeth, very common in midden heaps. The skulls badly decayed.

Tamias striatus—Chipmunk.

Fragments of skulls, more broken and more decayed than the other rodents, identification uncertain except in few cases.

Ruminantia.

Cariacus virginianus—Deer.

Skulls very much broken up, several upper jaws separated, usually retaining the molar teeth; lower jaws common, usually retaining the teeth, heads of the long bones common, and various implements made from the metatarsal bones ground flat on one side and various implements made from the horns.

Cervus canadensis—Elk.

Several molar teeth, heads of humeri and femurs, portions of horns made into various shapes.

Alce americanus—Moose.

Molar teeth, heads of humeri, femurs, portions of the horns cut into various devices. These were all found in the Whitchurch village sites.

Carnivora.

Ursus americanus—Black Bear.

Remains of this animal were abundant in all the village sites. Broken skulls, canine teeth, many with holes through the dentine, heads of the long bones usually in pieces, from two to six inches long. These were usually in a good state of preservation, and identification is easy and certain.

Procyon lotor—Racoon.

Skulls broken in the usual way, a few lower jaws nearly whole retaining the teeth.

Mephitis mephitica—Skunk.

A few broken skulls from sites in Whitchurch.

Lutra canadensis—Otter.

Several fragments of skulls doubtfully referred to this species, one perfect enough for identification, the cuspid teeth worn down to the alveolus.

Gulu luscus—Wolverine.

Several fragments of skulls and lower jaws, too much broken for certain identification. This animal was common in the forests of Ontario during the early part of the last century.

Putorius vison—Mink.

Several broken skulls of the smaller species of Martinae doubtfully referred to P. vison.

Mustela americana—Pine Marten.

A few broken skulls referred to this species which was formerly common in the forests of Ontario, preying on rabbits, squirrels, and smaller rodents.

Mus'ela pennanti—Fisher.

Fragments of skulls and a few broken femurs, referred to this species with considerable certainty. This active and powerful animal was common over the Ontario forests, in the days of the early settlements, preying upon rabbits, muskrats, and rodents generally.

Vulpes fulvus—Red Fox.

Many broken skulls, a few more perfect readily identified, numerous pieces two to four inches long appear to have been made from the long bones of the fox. These pieces of bone are usually well polished, being worn smooth from long use as ornaments of some kind.

Canis occidentalis—Wolf.

Many broken skulls, lower laws broken at the symphasis, teeth, and heads of the long bones humeri and femurs belonging to this species or to the Indian dog. Many pieces o fthe long bones shaped into various tools.

Lynx canadensis—Wild Cat

A few broken skulls and lower jaws, some of them retaining the teeth, and several implements and ornaments made of the long bones.

WAMPUM RECORDS OF THE OTTAWAS.

In the accompanying cuts we have some souvenirs of the days of wampum belts. A century ago such articles were in evidence among the eastern tribes, but almost unknown to the prairie tribes and western Indians generally. One reads so often of the giving of belts in early years to the eastern Indians that it is worth our while to learn something about them. In every case the belts figured here are a curious mixture of European and aboriginal symbols. It is noticeable in this group of belts that European symbols are scarce in the early ones and increase in the later ones. The copies from which these instructive engravings were made were taken from drawings belonging to Mr. Edgar Hallen, Orillia, who very kindly lent them for the purpose of publication. The drawings were facsimile copies of the belts (their full size), and were made by his father, the late Rev. George Hallen, from originals lent him by the Indian Chief, Assekiknk (Blackbird), in 1852. (His spelling of the name is used.) Wherever any memoranda were pencilled by the elder Mr. Hallen on the margins of the drawings, containing information about the belts, they will be found among the following notes:—

Figure 25.—This belt consists of 22 strings or strands, each string containing 458 beads, or a total of a little more than ten thousand beads (10,076). The human figures, with hands clasped indicate that a treaty is in force. The hexagonal figures doubtless symbolize national council fires. The belt contains the date 1764, woven in two parts "17" and "64" in the wampum beads, like an old-fashioned sampler. Just after the Pontiac war, deputies and warriors from many tribes assembled at Niagara in July, 1764. Amongst them was a band of Ottawas from Michilimackinac, and it was doubtless to these that the belt was then given by Sir Wm. Johnson, whose name was written on the drawing by Mr. Hallen, who had also pencilled on the margin of the paper the following particulars of the ends of the belt:—"The leathers are not above from half an inch to two inches long at the beginning, and half an inch to one inch at the ending. There are six branches of beads at the beginning, containing altogether 192 beads. One of the leathers is tied to the belt with a violet or blue riband. Number of beads, in each branch, 6 July, 1852: 20, 35, 38, 40, 30, 29: total, 192."

Figure 26.—It consists of 12 strings, each contaniing 590 beads, or a total of 7,080 beads. The words "24 Nations" are written in two places on the margins, and they evidently explain the meaning of the 24 human figures on the belt. Mr. Hallen further notes on the margin the name of Nishkawzhininee. At the left of this name are the words,"his father," probably meaning Assekiknk's father. At the right of the name it is stated "the belt of 1764 was given to him," evidently referring to this belt. Beneath the above Indian's name is that of Nawsomushkooda, with the remark "lives

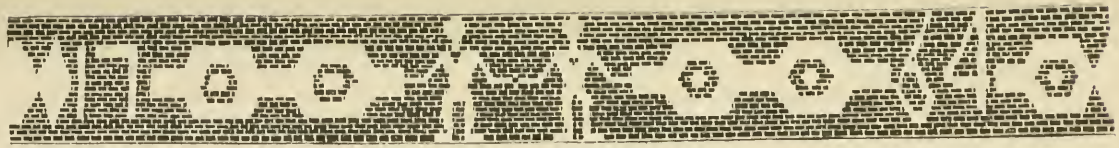


Fig. 25, Belt No. 1

Fig. 26, Belt No. 2

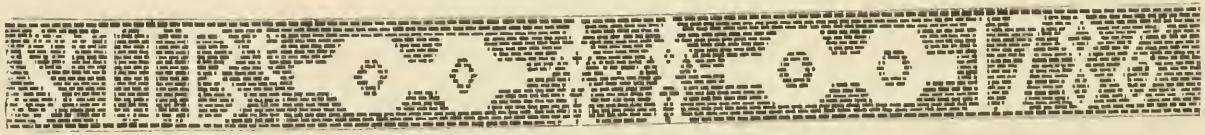


Fig. 27, Belt No. 3

Fig. 28, Belt No. 4

WAMPUM BELTS OF THE OTTAWS.

in the States." And beneath that again is the name of Mookoomaunish, "at Weikwamikong." Mrs. Jameson (Travels, 1837, Vol. 3, page 273) spells the latter name Mocomaunish (the Bad Knife). The three names are perhaps those of the chiefs through whose hands the belt passed from 1764 till 1852. In all probability this belt was one given by Sir Wm. Johnson at the famous Niagara pow-wow in 1764.

The pattern shown on this belt, viz., human figures clasping each other by the hand and holding onto a ship at one end of the chain and a wigwam at the other, does not seem to have been uncommon on wampum belts. The old Chief of the Oka Indians at Two Mountains, near Montreal, had a belt of similar pattern. It was commemorative of their treaty with the British, as the figure of the ship would lead one to suppose. The import of the Oka belt, as described to the writer by an aged Indian who had seen it and heard it explained, was that the British were bound to supply the Indians with annual presents from the ship. If they should fail, the Indians would be at liberty to act unitedly to secure their just rights. The annual presents were to be given in return for the lands the white men took from the Indians. Such was the meaning of the Oka belt, and such is probably the meaning, or nearly so, of the belt of the Ottawas shown here. It is a very free translation of the pictographs, but comes near the meaning. Mr. Hallen pencilled on the margin of this belt the following particulars as to the ends of the belt:—"Size of leathern strings, about one-tenth of an inch in breadth, varying from 4 to 14 inches in length. They hang out at each end of the wampum belt."

Figure 27.—It consists of 20 strings of beads, each containing 516 beads, or a total of 10,320 beads. It is a hybrid of Indian pictographs, Roman capitals and Arabic numerals. Let us hope nobody will take this remarkable combination as evidence of Hebrew origin of the Indians. Two antique I's are used for J's, which are the initials of the name of Sir John Johnson, Bart. The belt was given about the time (1786) of the threatened outbreak between the Indians of the lakes and the new American republic. The volume of Canadian Archives for 1890 (Calendar of State Papers, p. 178) mentions an Indian council in 1786 (July 25), at which deputies of the Ottawas, among others, were present. Perhaps the belt was then given. Mr. Hallen pencilled the following remarks on its margin:—"This belt, in 1811, was painted red and taken by the Indians when passing through.... At the close of the war, in 1815, it was washed. At the beginning of the belt is pencilled the following:—"The leathers at this end are about three and a half inches long. Appended to the fourth row of beads from the bottom are five branches, one of them looped. There is a light blue riband at the place where they are attached. The branches contain altogether about 828 beads." At the ending is written:—"The leathers at this end are about four and a half inches long. Breadth of leathers at this end about one-eighth of an inch."

Figure 28.—It consists of fifteen strings, each containing 608 beads, or a total of 9,120 beads. The only pictograph on the belt is that of a peace-pipe, the rest consisting of the name of Lieut.-Col. McDouall, who relieved Mackinaw in 1814 when the Americans threatened it, and held command at the post for some time afterward. But the belt-maker was almost as sparing in the use of letters as the Latin epigraphists. It is also worthy of notice that the spelling of Mackinaw (McKinac) shows that the belt-maker mistook the post for a Highland Scotsman. Or it may be that the presence of so many persons of that nationality among the early fur-traders had already begun to leave its marks upon American spelling. Mr. Hallen pencilled on the margin, "year 1815," which no doubt shows when it was presented. At the ending of this belt is written: "To the upper row of beads at the end some thread was tied with two white china beads on it very clear, not transparent. Leathers, 3 to 4 inches long at each end."

A. F. HUNTER.

During the last few years there has been developed a craze for the collection of wampum belts, and those in the hands of private persons are held at exorbitant figures. The fact is that most of such specimens possess no archaeological value whatever, consisting, as they do, of white-man's-make material, while, ethnologically, they are little better than curiosities illustrative of an Indian-European combination of ideas, and workmanship.

It is more than likely that many of these belts were entirely made by Europeans, with just enough "Indian" in the make-up to make them pass muster among the natives for commercial and treaty purposes.

D. B.

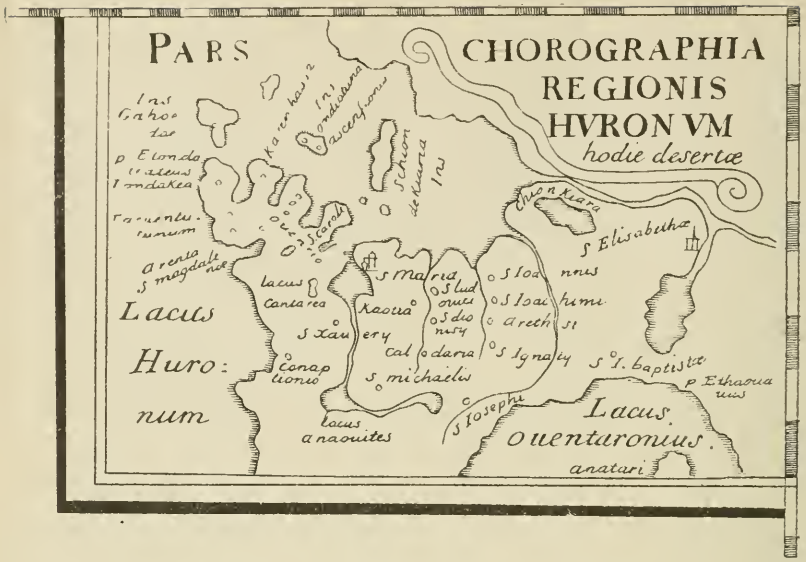


Fig 29.
Ducreux's Map of the Hurons' Territory (1660).

NOTES ON SITES OF HURON VILLAGES IN THE TOWNSHIP OF MEDONTE (SIMCOE COUNTY).

By Andrew F. Hunter, M.A.

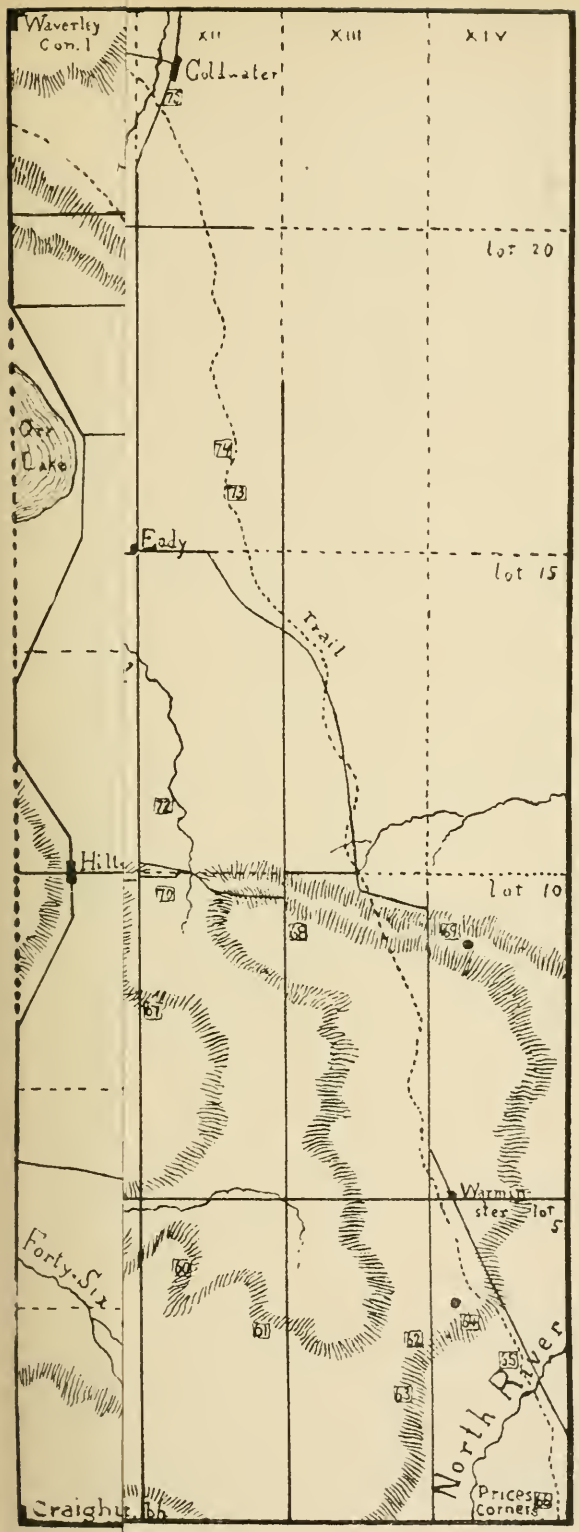
The following notes on Huron village sites in the Township of Medonte are submitted for publication in the same form as my Reports on Tiny and Tay, previously published by your department. This being the third of the series, it has been prepared on the same plan and with the same objects in view, as the former ones, viz., for the ultimate identification of sites of villages mentioned by Champlain and the other early historians, and for throwing light upon the Hurons generally. The notes have been collected at intervals since 1887, and are submitted for the benefit of those who are interested in the history and archaeology of our Province, to whom I trust they will prove of some value.

I have the honor to be,

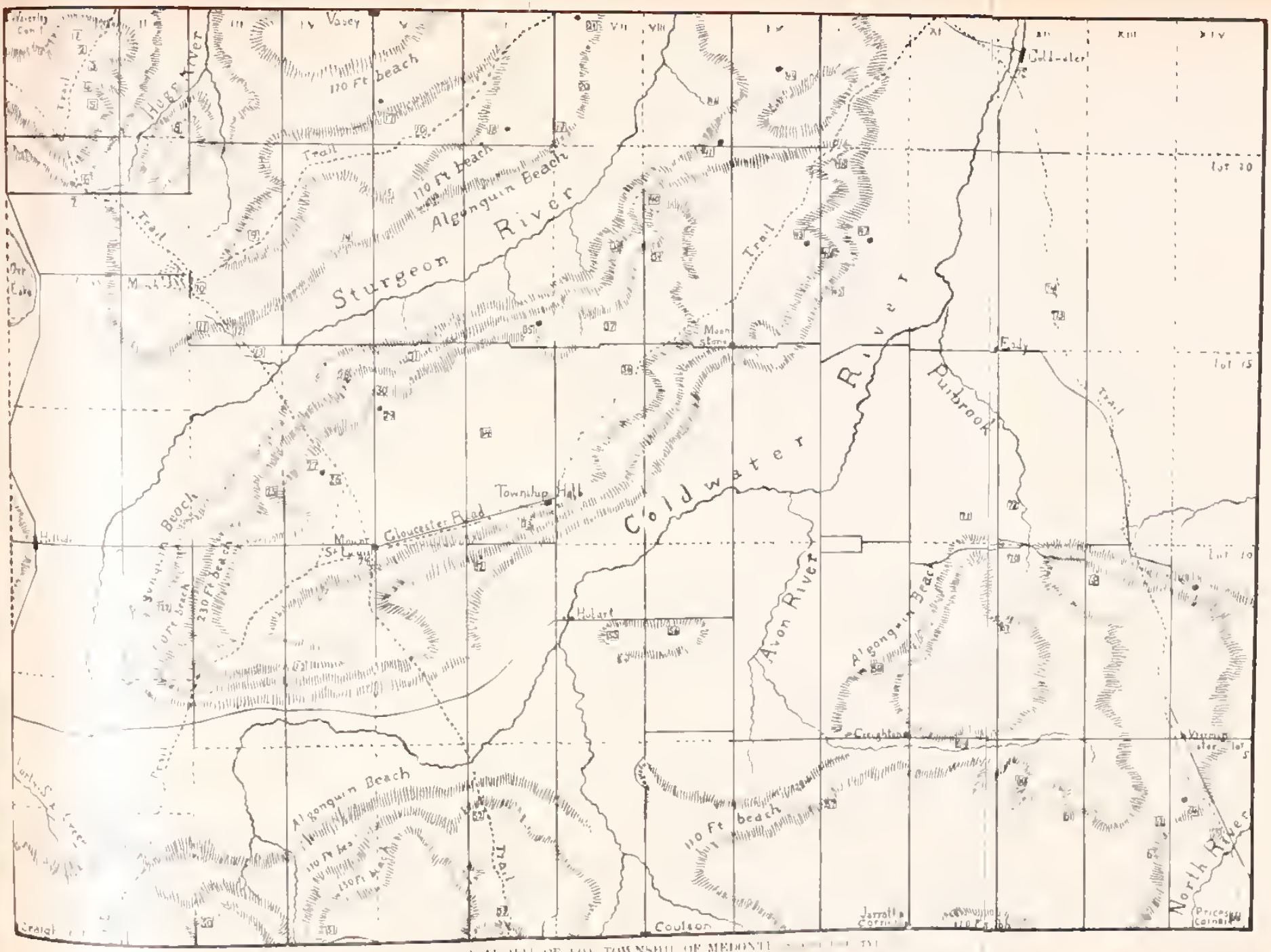
Yours respectfully,

A. F. HUNTER.

Barrie, Ont., November, 1901.



EXPLA[illegible]he text, of which it forms a key. The heavy dots indica[illegible]d, the extinct shore line being supposed to run along the ba[illegible]



ARCHÆOLOGICAL MAP OF THE TOWNSHIP OF MEDONTE [illegible]

[illegible] the boundaries of the tract of which it forms a key. The heavy [illegible] and of the positions of the different village sites and the enclosed numbers [illegible] to the description of the text of which it forms a key. The heavy [illegible] Beach,

INTRODUCTION.

Physical Features.

The Township of Medonte has a central position in the hilly tract between Georgian Bay and Lake Simcoe, where the Huron Indians lived during the first half of the seventeenth century. It is of a regular shape, about nine miles from north to south, and twelve from east to west. An alluvial plain occupies nearly all of its westerly side. Proceeding from this plain, three sharply-cut valleys (whose bottoms have a level similar to that of the plain) traverse diagonally from southwest to northeast the remaining parts of the township, dividing its surface into four well-defined portions. I shall call these its four ridges, though each might be more fitly called a group of ridges than a single one. Through each of the three valleys flows a river, thus more effectually dividing the township into four natural divisions. The names of the rivers are the Hogg, Sturgeon and Coldwater. Besides these, the North River crosses the southeasterly corner of the Township, but only slightly affects the physical features. The four ridges thus formed, with a river between every two, may be named: (1) The Waverley Ridge, west of Hogg River: (2) the Vasey ridge, between that river and the Sturgeon: (3) the Mount St. Louis ridge (which in Tay I called the Rosemount ridge), lying between the Sturgeon and the Coldwater: (4) the Coulson ridge, lying along the whole southerly side of the township, and which really consists of the ends of various high ridges in the northern part of the adjoining Township of Oro.

Each ridge consists of high rolling ground, well suited for Huron occupation: and on all the ridges village sites are found in considerable numbers, especially along their edges, where the land rises out of the valleys. The distribution of Huron village sites depends on the physical features—on the extent and directions of the ridges and the courses of the rivers—as I pointed out in the township reports previously issued. It is not a part of the plan of this enquiry to give a complete account of the physical features of the township, but it is indispensable for the proper understanding of Huron occupation to know the main features of its surface.

The Raised Beaches.

Up the sides of the ridges there are many raised lake beaches, and the terraces cut by them may be clearly seen. Everywhere we see these proofs that what is now land has been lake bottom, and that this change from water to land has taken place in very recent geological ages. Though at first sight these raised beaches may appear to have little bearing upon our subject, at a closer examination they will be found to possess an intimate relation to the villages.

Now, along these old beaches in many places there are swampy patches, often quite narrow, but made very wet by springs issuing

at these lines. Here moisture is kept all the year round, and frequently the springs are so strong as to trickle out and form rills or rivulets, flowing onward to the rivers, and, in fact, producing them. It seems that when the old lake surface stood for a time at each of these marks, underground courses of the water were established, so as to let the drainage out of the ground at the level of the existing shore line. The process of forming other similar underground courses was repeated as often as the water surface fell and made a new beach. And now, after thousands of years (the lake level having sunk some hundreds of feet lower), these old underground water courses continue to be the grooves in which the natural drainage of the land is discharged to the surface of the ground. Like many people, otherwise well-meaning and estimable, the springs have shown a tendency to get into ruts, out of which you cannot possibly shake them.

Almost invariably at the springs along these lines the Huron aborigines selected their dwelling-places, and got their supplies of fresh water. And, accordingly, the line followed by an old beach in nine cases out of ten becomes the line along which the Huron villages are situated.

Our own ancestors, before the invention of pumps or wells, lived in similar situations. Topley (Journal Anthrop. Inst. iii., 34-49) shows that in the southeast of England, "along the foot of the chalk escarpment, where the settlers found good water," there is a line of village communities; and that of 125 parishes along the Weald, no less than "119 belong to villages situated at the foot of the escarpment." Let nobody make this resemblance a proof of the identity of our own ancestors and the Hurons, or of the Anglo-Israel and the Indian-Israel theories. Nor need anyone anxious to promulgate some new theory imagine he sees in this circumstance the effects of European (French) influence on Huron customs. To settle near where fresh water was to be found was an indigenous custom among the Hurons. Human needs are much the same in all ages and countries, and will compel widely separated races to act alike under similar conditions.

That strong beach known as the "Algonquin" furnished many of the Huron villages in Medonte and elsewhere with their water-supply. More than a fifth of the villages are beside it, while nearly all the others are found in close proximity to higher beaches. In this township the "Algonquin" is about 250 feet above the present level of Georgian Bay. The extinct lake which formed it, as well as its higher-level predecessors, washed through each of the channels between the four ridges, the latter having been islands in these old lakes. They rise to a considerable height in some places—at one place on the Gloucester road, near the Township Hall, the top of the ridge is about 530 feet higher than the Coldwater River. With the fall of the "Algonquin" Lake's surface to a lower level (or better, with the rise of the land), the channels between the "islands" became dry, and it is only in the Coldwater valley that the beaches

of the succeeding Great Nipissing series make their appearance. These do not run much farther up the valley than Hobart.

Still further, in the absence of good contour maps of the district, such as the Ordnance Survey maps of Great Britain, these beaches, if mapped, will serve as altitude lines. They are easily observed, and their altitudes may be readily taken by means of a pocket aneroid. No large sum of money, therefore, need be expended for level-surveying; in fact, levelling instruments are not even required to get the contours. In a limited area like a township, where the effect of uplift on the beaches is insignificant, they become, in short, natural altitude lines, the marks of which are permanently on the ground itself.

Accordingly, for the purpose of showing the intimate relations between the raised beaches and the village sites, as well as for recording the altitudes of the different parts of the township, I have adopted the plan of mapping these beaches, as in the Report on Tay. It is not easy to indicate profile on a flat map as clearly as one might wish. In making a choice of graphic conventions for showing beaches, a slight change is made upon the symbols used in the Tay Report. For the "Algonquin" beach the heavy curving line is omitted for the sake of simplicity, and shading is alone used, such as map-makers generally use when hills or other kinds of relief are to be shown. Similar shading shows, in the order of ascent, the next strong beach (probably a tidal one, as its appearance indicates), at about 110 feet higher; and likewise the strong beach about 230 feet above the "Algonquin." The latter occurs only on the Mount St. Louis ridge, and along the southwest part of the township. The lower beaches of the Great Nipissing series in the Coldwater valley are less intimately associated with Huron sites than in Tay, and I therefore omit them from the map, so as to avoid the multiplication of details.

The Shoreline of 1649.

It is safe to assert that Champlain and Brebeuf landed among the Hurons on a beach that is now high and dry, the surface of Georgian Bay being many feet lower in our time than in theirs. At Ste. Marie on the Wye, one of the most prominent features of the ruin is its system of artificial trenches, or what the English translator of Isaiah might call its "brooks of defence." The visitor must have observed how these are now entirely destitute of water, the river being many feet below, and incapable of filling them. When the writer measured the amount of this drop (September 13, 1901), it was ten feet from the surface of the river to the top of the bank, where the main trench enters. The brow of this bank has probably suffered denudation, and the fort itself is now more than forty yards distant and on slightly higher ground. Hence it would appear to require at least twelve feet of a rise to completely fill all the empty trenches.

The surface of the Wye in this part of its course, viz., between Mud Lake and Georgian Bay, a distance of about a mile, has the same level as that of the bay itself. When the surface of the bay rises or falls with any change in the direction of the wind (and here the wind exercises a great influence over the level in the long arms of Matchedash Bay), a current is set up. It flows inward or outward according to circumstances, and locally is called a "tide." Accordingly, our measurement of the fall of the river by twelve feet, since the fort was abandoned in 1649, also holds true of the surface of Georgian Bay itself.

A similar measurement of the drop is obtained from Ste. Marie on Christian Island, which was also built upon the shore in 1649, but is now quite high above the present shore.

This lowering of the water does not seem to have occurred suddenly. Fully one-third of it took place in the nineteenth century. There are persons living who remember the time when the bay level was four feet higher. Due allowance has to be made for the direction of the wind and for the time of the year at which the observation is made, as it appears to have become subject to greater fluctuations with the seasons after the surrounding land began to get cleared. But, making every allowance, a decline of the level within the memory of living persons is well established.

Since Bayfield's survey of Georgian Bay, about 1820, the fall of level to the present time has been estimated at four feet six inches, and various portions of land, which were islands then, are now, at all seasons, parts of the mainland*

The Ojibway land surrender of 1798 became the townships of Tiny and Tay. The southerly boundary of this tract (which is also the northerly boundary of Medonte) appears to have been measured from the head of Coldwater Bay across the peninsula to Nottawasaga Bay. This information furnishes us with the means of knowing where the head of Coldwater Bay was fixed at the time that survey was made. But to-day the bay head is about a mile farther north. The land in the Coldwater valley is quite low for a long way up—only a few feet higher than the present bay level; and we are thus shown how far the bay recedes down the valley with a fall of about four feet in eighty or ninety years. A full consideration of this question of the old water level, from the foregoing sources of evidence, accordingly becomes important in connection with the northeast corner of Medonte. Taking into account all the facts in the case, it is not easy to escape from the conclusion that in Huron times, when the level of the water was twelve feet higher, the head of Coldwater Bay was about three miles up the valley (i.e., about two within Medonte.)

The higher shore line of 1649 would necessarily be, in many other places, more deeply serrated with long bays than the present shore line: and this circumstance supplies an explanation as to

* I am indebted to C. E. Newton, Esq., of Victoria Harbor, for having called my attention to this circumstance.

some features of Ducreux's map, which was published in 1660. It is really a map of the old shore line, and it would be difficult to identify it with the existing beach, even after making due allowance for the probable lack of any actual survey on the part of its makers. There is much discrepancy, at any rate, between the prolonged Coldwater Bay, as shown on that map, and the actual Bay on maps of our day; and there is nothing unreasonable in supposing that the difference arises from an extension of the Bay three miles farther up the valley.

The conclusion thus reached suggests a query as to the seeming eccentricities of some other early maps of our lakes and watercourses, especially maps of any small area prepared with minuteness of outline. May not their deviations from modern contours be partly due to the change of a few feet in level, rather than wholly to blundering of the draughtsmen?

Some further circumstances of less importance, but still having a bearing on the subject of the water level, deserve notice. In Tiny and Tay, as also at Coldwater, amongst remains of the aborigines found lower than the old level of 1649, and near the present shore line, Lorraine or double-barred crosses are usually found. These belong to the period after 1715, and therefore cannot be classed as Huron relics. In these low parts, also, there is an absence of French axes of the seventeenth century. The latter is purely negative evidence, and we should be lacking in scientific caution if we accepted it as proof of the wider extension of the waters in Huron times, especially up the Coldwater valley. But it has its due significance, and is worthy of note.

The writer is unable to say that he has observed shore line markings at exactly 12 feet above the present water level. But a raised beach (the lowest to be seen) can be observed around Victoria Harbor at about 18 feet above the present level. And in the Coldwater valley, also, I observed marks which I measured at about 20 feet above. It is doubtless the same raised beach in both localities, the small difference of two feet in the measurement being probably due to uplift. Is this the shore line of 1649? As the water surface here is raised many feet during every storm from the northwest, one might have some inclination to identify them. It is more probable, however, that the 18-foot beach belongs to a century before the Hurons, and that few or no markings survive of the beach of 1649. Then, as now, the surface was perhaps slowly falling. The subject is one of much interest, as well as value, and deserves to be carefully worked out. From the various phenomena referred to in connection with the raised beach at 18 feet and the parts below it, some idea of age can be formed. It serves as a chronometer, about three centuries having elapsed since it was occupied by the water; and it gives promise of being a geological timepiece of some value, affording us an idea of the long lapse of time since the higher raised beaches were formed.

Other Physical Features.

Other circumstances, besides the division of the township into four natural parts or ridges, had their effects upon the distribution of Huron population. As I pointed out in the report on Tay, the Sturgeon River appears, from the abundance of Huron remains near it, to have been thickly inhabited on both sides, and the same abundance is found in Medonte as well as Tay. This result agrees with Ducreux's map, which marks a chain of villages along the easterly side of the river. Perhaps the thick population here was due to the good beaver-hunting and the fishings along the river.

It is said that when the first settlers came to Medonte the Sturgeon River was well supplied with fish, among which were doubtless the sturgeon, otherwise the river would have received some different name. But the brushwood and fallen timber was afterward cleared out of the stream, and sawlogs were floated down from the Clipper Mill, in Concession V. This checked the fish from increasing. Besides, there are now two mill dams in the river, which further reduce their numbers. The consequence is that bass, catfish, perch, sturgeon, and pike are seldom or never caught in the river; only a few large brook trout and grey suckers are found. Beaver marshes are to be seen along the river, which show the presence of beavers in former times, and which may also partly account for the preference the Hurons had for it.

That a greater number of sites face the Sturgeon River than the Coldwater is perhaps accounted for by the fact that the Coldwater has no beaver marshes, so far as I can learn, and certain kinds of fish have not been plentiful in it. This might be because of the coldness of the water, but I cannot say positively. Still further, the hills that face the Coldwater are generally steeper than those facing the Sturgeon, and there are fewer spurs that could be used as dwelling places—considerations that might have had some influence on their choice.

In concluding our general survey of the physical features, and their bearing upon Huron occupation, it should be added that from the three main valleys there run lateral gullies, at the heads of which villages were often located.

No rocks are exposed anywhere in the township, but steep cliffs of boulder clay often confront the traveller. In some places there are patches of boulders, though probably none of these are so extensive as the patches in Tay.

The hills of Medonte (for which the township is noted) have been the cause of many deviations in the public roads, which have had to be deflected in order to avoid the steep places. Further deviations are due to "jogs" or irregularities in the survey, which probably arose from the same cause, viz., its hilliness. In a number of places some of the roads are still unopened owing to the practical difficulties in road-making across swamps and over hills.

At these places the road allowances are marked on the map by dotted lines.

All the roads are marked on the map, by means of which the reader can adopt a scale of measurement for any distances he may require to know. In that part of the township called the Old Survey, which consists of Concessions One and Two, the sideroads are placed at every fifth lot, and are a mile and a quarter apart (100 chains). The lots number from south to north, beginning with No. 41 at Craighurst, and ending with No. 75 at Waverley. In the First Concession they are a mile and a quarter deep, but those in the Second have a depth of only one-half of that amount. Concessions Three to Fourteen make up the New Survey. These are five-sixths of a mile wide (66 2-3 chains), and have sideroads at every fifth lot, or a mile and seven-eighths apart (600 rods). The lots are numbered from south to north also in the New Survey, running from No. One to No. Twenty-four.

It would be confusing to use numbers for the "lines" or roads between two concessions, as the usage of the settlers in Medonte differs from that of many other townships. They give the number of a concession to the line after it, and not to the one before it, as in so many other townships.

What Huron Tribes Occupied Medonte?

Although there are four clearly-defined ridges in the township, occupied by four groups of villages more or less distinct from each other, it is improbable that they represent as many distinct Huron tribes. The Jesuit Relations frequently divide the whole of the Hurons into Attignaouentans, Ataronchronons, Attignenonghacs, and Arendaronons. In our formerly published reports, we found that about the middle of the historic period, viz., about 1640, the first of these—the Attignaouentans or Bear people—lived in Tiny; and that the Ataronchronons lived in Tay. The result of our present enquiry is to find that the Attignenonghacs or Cord people lived entirely within Medonte, and that a few villages of the remaining subdivision—the Arendaronons, or Rock people—occur also within the township.

In any attempt to assign these tribes to particular parts of the district, it will be well to emphasize the fact that such attempt can only apply to a time about the middle of the historic period, 1615-1650, say 1640. At one time or other each of the four tribes probably passed over or sojourned in Medonte, leaving their relics strewn over the ground, and their village sites for our entertainment or confusion. In the beginning of the historic period, Champlain (whether from omission on his part or because there were no others in the district at the time), mentions the Bears as the only tribe in all the district. But later writers distinguished four principal tribes. Some give their names as above, while others give them as the Bear, Wolf, Hawk, and Heron people. The latter was evidently a classification of them into clans rather than into tribes.

But their villages might have been loosely, or in some general way, occupied by families having the same totem, and thus there would be some correspondence between tribes and clans. If we try to get any light on the geographical position of the clans from the distribution of their totem pipes (bears, wolves, hawks, and herons), we fail, so far as I have collected any evidence on this point. I have found that the different kinds of totem pipes are spread over the district without regard to any particular locality. Some day, however, by a closer scrutiny of this feature, a numerical preponderance amongst these pipes may be found which will throw new light upon the subject.

Even about the time in question the lines of demarcation were not so sharp as we might expect. On Ducreux's map, which gives the positions of the missions as they were about 1640, those along the east side of the Sturgeon River are given as follows:—"S. Joannis, S. Joachimi, Arethsi, S. Ignatii." These are obviously situated on a single ridge—the Mount St. Louis ridge, which extends into Tay. And it is to be observed that these missions, although on the same ridge, belonged to no less than three of the tribes. The Relation of 1640 informs us that St. Jean (S. Joannis), which should be distinguished from St. Jean Baptiste, was among the Ataronchronons, who doubtless lived in Tay; that St. Joachim was among the Arendaronons: and that St. Ignace was among the Attignenonghacs. Notwithstanding this apparent want of correspondence between tribes and ridges, it is probable that the Attignenonghacs were the occupants of the greater portion of the Mount St. Louis Ridge and of the whole of the Vasey and Waverley Ridges, for a considerable period.

On the margin of high land along the south side of the township, which we have called the Coulson Ridge, beginning at the south-west corner, and for some considerable distance along this ridge, there were not enough villages, so far as our enquiries have yielded any results, to enable us to arrive at any definite conclusion as to the kinds of Hurons that occupied them. In these parts, perched on tables or terraces around this high ground, which extends into Oro, were five villages of early date : Nos. 49, 50, 51, 52, 53. They show features similar to those of the adjoining parts of Oro, which were perhaps early villages of the Attignenonghacs.

Position of the Arendaronons or Rock Tribe.

To determine the position of this important branch of the Hurons is not so easy as might first appear. Their more probable abode, at least of most of their villages, was in northeastern Oro, in the vicinity of Bass Lake, where a large number of village sites have come to light. This was the view advanced by the writer in some notes in the Burrows Reissue of the Jesuit Relations, and nothing has since transpired that would demand any change of this opinion. The remains found in Medonte near Fairvalley and War-

minster were perhaps of outlying villages of the same tribe, which extended northwestward to the Mount St. Louis Ridge, as we have just seen. But the early Algonquins, among whom the mission of Ste. Elizabeth was established, were also near, if not within the township. The exact position of the latter, however, cannot be determined without an exploration of the adjacent Township of Orillia, to find any differences that might exist between their sites and relics, and those of the Hurons.

The Village Sites.

In making these notes in the field and bringing them together for the descriptions of the 75 village sites, some disadvantages have been met with. It is probable that the numerous changes of residence among the settlers of Medonte have resulted in limiting my resources of information,—arrivals and departures having taken place quite frequently on almost every farm since the land began to be cleared. And my promiscuous or disconnected methods of enquiry from the present occupants have doubtless prevented me from learning of many more. Hence one-half of the places where Huron aborigines had camped may still be left unrecorded.

But our survey of the township, which is thus avowedly so incomplete, probably includes the more important sites, and especially the bonepits, which are almost always well-known, and the topics of general conversation. Enough has been done to show the distribution of the villages along the borders of the ridges where these meet the valleys, the courses of the Huron trails, the places of thickest population, etc. Briefly, a collection of data has been formed that will be useful in taking a first step toward an improved view of the Huron occupation of this township, and indeed of the district generally.

In the descriptions of the sites, much of the material is the result of my own observations. Some of the statements, however, are necessarily made upon the oral testimony of persons untrained to observe, or what, so far as I am concerned, was "hearsay evidence." It is in the nature of things for all evidence to become "hearsay" with each remove from its source. But so much information has already been lost that even going over the ground as a reporter would do and noting interviews should be received with satisfaction, as it is in many cases the best that can now be done for the subject. This portion of the notes is thus quite as reliable as newspaper literature, and, indeed, more so, because it has been carefully sifted. Every effort has been made to keep a sure footing on the ground of ascertained fact.

The usual signs of a village are the ashbeds and blackened patches where the cabins stood, and over which the ground is strewn with fragments of pottery, with other fragmental deposits of domestic utensils, and occasionally a whole relic. In view of the fact that ashes check the decay of organic matter, it is possible to understand why black patches mark the spots where the lodges

were erected. Nearly the whole ground of a site would become black from the offal, etc., of the villagers. But decomposition would soon restore its first color to the soil, and in the opinion of the writer the ashbeds have been the cause of checking this decay in patches. In other words, the progress of decomposition was arrested wherever ashes were strewn amongst the organic matter. Calcined fragments of wood are also very durable, but they do not fully account for the extensive patches of black ground found at every site.

The village sites are distributed on the four ridges, as follows: —Waverley Ridge, 7; Vasey Ridge, 14; Mount St. Louis Ridge, 27; Coulson Ridge and adjacent parts, 24; in the lower half of the Coldwater Valley (of recent dates), 3. On the high central Mount St. Louis Ridge, villages were more numerous, and population appears to have been thicker, than on the other ridges. But it should be borne in mind that these seventy-five villages were not all occupied at the same time. Our plan of numbering and describing them is to begin at the northwest angle of the township and take each of the four natural groups in succession.

It has now been made sufficiently clear that the favorite dwelling-place of the Hurons was on the hills, nearly always at an old beach where abundance of spring water could be had. Besides the better security to be found in hilly situations, there was, perhaps, something in the nature of the Huron races themselves that required their settlement on hills where the soil and the air were both drier than on the low ground. They always selected for their sites porous or sandy loam with natural drainage. The habitat of the Hurons upon the hills of Medonte and adjoining townships was thus well pronounced in its type. It differed widely from that of another earlier Indian race in parts of the same district, and was in striking contrast with the latter, signs of which occur especially along the lower waters of the Nottawasaga River, near Georgian Bay, the remains of the two races, however, being placed favorably for comparison.

The Huron villages were of all sizes. Those at which bonepits occur were generally large. When compared with the villages of Europeans, or even with those of modern Indians, the large populations in Huron villages appear to have been huddled together in an extreme degree. The largest site, No. 26, covered a space of about 15 acres; and as I have explained in the description to be found on a subsequent page, it was probably St. Joseph, which was alleged to contain 400 families, or at least 2,000 souls, at the time of its surprise in 1648.

Some of the villages were doubtless palisaded, but no traces remain of embankments, and it would require much examining with the spade to find the palisade of any particular site. This was not attempted by the writer in any case. But palisading may often be inferred from the position of the site on an isolated hill or on a spur. We cannot think the precaution of selecting a na-

turally fortified position would be taken without the construction of the palisade itself. Amongst the villages that in this way prove to have been palisaded were:—Nos. 3, 11, 22, 23, 24, 25, 26, 33, 35, and 53.

Earthworks, in the special sense of the word, are entirely absent. But embankments or trenches of a fragmental kind are mentioned under Sites Nos. 26, 32, and 37. And as iron relics are found at all three places, it is not improbable that early French missionaries or traders had something to do with their construction.

The metal portions of articles that the French traders brought to the district, or that Hurons visiting the city of Quebec procured by bartering furs, are found in abundance. Conspicuous among these is the iron tomahawk, which has been found in thousands. Such metal relics are definitely reported from 55 of the villages herein described, or 73 per cent. On passing from the three northerly ridges to the southerly one, iron relics cease to be so plentiful in the latter ridge as in the former. This greatly decreased proportion makes a distinctive feature, that deserves to be carefully noted.

The usual kinds of stone, bone, horn, shell, and pottery relics, usually found on aboriginal sites everywhere, are common here. But it cannot be denied that, in comparison with village sites of some other races of Indians, more especially with those of earlier date than the Hurons, their sites are not so prolific in relics, nor are their patterns so luxurious, as the large population would lead us to expect. It is extremely desirable that persons who collect relics should carefully record the exact site where each relic was found. It is only in this way that relic-hunting is of any value as an aid to history, here or anywhere else.

Teanaustayé, or St. Joseph (II.)

It should prove interesting to scrutinize the village sites, and seek to identify this mission—the scene of the massacre of Father Daniel and a large number of Hurons in 1648. If a person desires to form some idea as to where it ought to be located on our modern maps, and, taking Ducreux's map as a guide, were to select a spot, in all probability the spot chosen would prove to be at some village site, there are so many. Another chance, however, is that the spot would be in a swamp, where no actual sites occur. Thus, so little is to be gained from Ducreux's map, that almost all we can infer from it is that St. Joseph (II.) was somewhere northwest from the sources of the Coldwater River. It could not have been in the low ground, near the river, because, as we have just seen, the Hurons avoided low ground for their dwelling places. Hence, it was likely one of the villages on the Mount St. Louis Ridge.

The Jesuit Relations furnish us with some collateral evidence of its distances from points whose positions are known more or less definitely. It was seven or eight leagues from Ihonatiria (Relation, 1635, Quebec Edition, p. 39), which was somewhere near the north

end of Tiny Township. It was a league and a quarter (Relation, 1639, p. 72) from Scanonaenrat (St. Michael), which was sometimes classed as an Attignenonghac village, like St. Joseph (II.) itself, and which was immediately north or northwest of Orr Lake. It was five leagues from Ste. Marie on the Wye (Relation, 1644, p. 76), the position of which is exactly known.

Taking into account that there were many windings in the trails, and that measurements of distances would follow their meanderings, the foregoing data lead us to the conclusion that it could not have been farther south than the Mount St. Louis Ridge. The Coulson Ridge would be too far south. A scrutiny of the villages upon the Mount St. Louis Ridge shows that No. 26 was the largest and most probable site.

Father Martin showed such good judgment in all questions relating to the sites of the missions, when we consider what were his opportunities fifty years ago, that it is worth while taking into account his opinion as to the position of this mission. In the appendix to his "Life of Jogues," he tells us that "Ducreux's map and historical references seem to indicate as its site a point now called Irish Settlement, in the north of Medonte District (township). Traces of a large Indian town, and especially fragments of coarse pottery, are found here." Father Martin means, of course, the Irish Settlement around Mount St. Louis, and in particular the Fitzgerald site (No. 26), as I have definitely learned from John P. Hussey, who accompanied him while he was in this neighborhood in 1855. Dr. Tache also believed at one time that Fitzgerald's site was St. Joseph (II.), according to Cornelius Frawley, who worked with him during his archaeological excursions. But from the map he supplied to Parkman at a later time for the "Jesuits in North America," he appears to place it farther south. The only evidence at hand, therefore, goes to show that Tache's opinion, at the best, was vague and unsettled.

The Forest Trails.

A trail ran along each of the four ridges, and another crossed them transversely, connecting with the four ridge trails, as the trunk of a tree with its branches. We shall call the transverse one the Main Trail. From the positions of important villages, from the finding of isolated relics along the lines of travel, from the fact that they have been kept open till recently, and from the topography, we are able to lay down the positions of all these trails with some accuracy. In our survey, village sites have been found in sufficient numbers to show where the centres of Huron population were located, and how they were placed in relation to each other; and therefore, if these afford any evidence, how the trails ran. The occurrence of different kinds of forests, too, compelled the Hurons to select and follow routes along the highest parts of the ridges, where the woods were open, and free from underbrush. In the low ground of the valleys, evergreen thickets checked their progress.

The four ridge trails were :— (1) The one to Victoria Harbor, (2) the trail on the Vasey Ridge, (3) the Gloucester Trail, and (4) the Coldwater Trail. Modern Indians followed all these routes; they were Ojibbeways, but they kept open the forest trails of the Hurons until recent years, as I have already pointed out in my Reports on Tiny and Tay.

The Main Trail.

This crossed the valleys from one ridge to the next at the narrowest places. It appears to have entered Medonte about lot No. 73, Concession I., having followed the Waverley Ridge from villages in Flos and Tiny, which have been described in my Report on the latter township. This trail, with its extension to the Neutrals, was doubtless the one laid down on some early maps as coincident in a degree with the modern Penetanguishene Road. After following the Waverley Ridge, the trail crossed to the Vasey Ridge, near site No. 7, under which a description of the crossing may be found. It soon reached a huckleberry marsh, around which Hurons swarmed in great numbers, as the remains indicate; then dipped down into the valley of Sturgeon River, which it crossed near Site No. 13. It reached the high land of the Mount St. Louis Ridge, near Site No. 26, which I consider was Teanaustaye, or St. Joseph (II.). From this place its course is not quite so evident. Yet, one of its branches, beginning near this village, is known to have proceeded to the Neutrals. And it is to be noted further, that if we continue the trail as we have laid it down to this place, that is, carrying the line forward in the same direction, and passing Sites No. 52 and No. 53, to the south side of the township, it will reach a group of important villages in Oro, where bonepits were numerous, and where the ridges run chiefly at right angles to those of Medonte, and in a line with this Main Trail. No other important group of sites lies to the westward of these, and it is, therefore, probable that the line we have thus drawn, was the leading course taken by the traders and missionaries when going from St. Joseph (II.) to the Arendaronons, and particularly to St. Jean Baptiste. On this view the Coldwater River would be crossed at lot No. 5, about the line between the Fifth and Sixth Concessions, and this place proves, on inspection, to be a good natural crossing. The ground, higher than the "Algonquin" beach, makes its nearest approach to the river at lot No. 8, Concession 5, on the north side; while on the south, the foot of the high ground, known as Leith's Hill, is at the boundary between lots No. 4 and No. 5. At the river itself, in lot No. 5, there is the good crossing-place just mentioned, cliffs of sand facing it on both sides. The latter are the sides of a canyon, about 50 feet deep, through which the river here flows, or, perhaps, of a passage made narrow at this place by an extensive sand-spit, washed from the base of the high ground immediately to the northwest. Here the Hurons would find their most convenient crossing, and future research will no doubt prove

that they used this. There was at least one crossing west of this one—viz., on the trail leading to the Neutrals; but the wooded nature of the district through which it passed also prevents research for the present. As to crossing farther east, there might have been one in the vicinity of Hobart. Modern Indians have camped near the present Hobart School (lot No. 10, concession 7), and we are so accustomed to find the recent tribes following the trails of the Hurons that the circumstance is noteworthy in connection with our search for the old crossing-places in this valley. There are three sites on an isolated hill in the line of a trail at Hobart. Lower down the Coldwater Valley the land becomes deeper and wetter than at Hobart or any place westward. But in the vicinity of Eady, near the head of the Coldwater Bay of that day, there appears to have been another crossing. Here the valley was again constricted, and thus more suited for making a journey through it. And on the west side, old maps show an early road going up through lot No. 17, to the Gloucester Road, doubtless following a trail. The Relations furnish some evidence of a crossing here or at Hobart, as Father Martin, in his "Life of Jogues" (Appendix A), points out that Taenhatentaron, or St. Ignace (I.), was on the route between Teanaustaye and Cahiague. (See Site No. 48).

The Trail to Victoria Harbor.

This followed the Waverley Ridge, and has been already mentioned in my Report on Tay (p. 22). As very little of it lies in Medonte, it need not occupy our attention any further.

The Trail on the Vasey Ridge.

This passed along the ridge from Orr Lake to Victoria Harbor, as I pointed out in my Report on Tay (pages 22 and 32). But the evidence before us goes to show that the trail, as followed by recent Indians, was a little west of the old route, at least in some parts of its course. Huron sites occur in sufficient numbers on this ridge to enable us to lay down approximately its course in early times. It joined with the Main Trail near the huckleberry marsh described under Site No. 11, where, as I believe, there was an important Huron centre for many years.

The Gloucester Trail.

This ran to Gloucester Bay, an old name of some part of Matchedash Bay. It was opened as a Government Road about 1832, and the Gloucester Road became the leading highway through Medonte in the early years of its settlement. But it is now closed, except for two miles between Mount St. Louis and the Township Hall. Along this part of it, many signs of Indians, both early and recent, are to be found; old tappings, said to have been made by them, are still visible on maple

trees in Mr. Barr's bush (see Site No. 33). The trail was near the southerly side of the ridge, because here they found the land was higher in most places.

The Coldwater Trail.

This ran from Orillia to Coldwater, and was opened out as a Government road in 1830. It has been used chiefly by the Algonquins, running independently to Matchedash Bay, and was not directly connected with the trail system of the Hurons.

Burials.

In Medonte, these do not consist altogether of bonepits. Single graves among Hurons, at least in this township, appear to have been quite common. Patches of such single graves occur at the sites numbered 1, 2, 3, 4, 5, 6, 12, 13, 19, 26, 27, 29, 31, 35, 36, 37, 41, 49, 51, 64, 68, 69, 74. With almost every bonepit in the township there is associated a patch of these single graves. These are small, round pits; and a dead body, in order to fit one of them, must have been drawn up into a heap,—"the crouching posture," as it is usually called, whether correctly or not. This is a distinctive character of Huron burials, at least those in the township whose remains are the subject of our present enquiry. These Hurons appear to have buried in the single graves first, in summer at any rate, and then transferred the bones to the large communal pits when a Feast of the Dead was called. It may be that the mode of burial indicated here was more common with the Attignenonghacs than with the other tribes, as the sites mentioned above lie chiefly in their territory. We found scarcely any single graves in Tiny and Tay (see my Reports on these townships). There were few, or they did not force themselves upon our attention.

So far as I can learn, there were no burials in mounds among these Hurons.

DESCRIPTIONS OF THE VILLAGE SITES.

I.—Those on the Waverley Ridge.

1. On the east half of Lot 74, Concession 1. John Scarlett. Iron tomahawks, clay pipes, pottery fragments, stone axes, etc., have been found at this site, which, with the four following, is on the highest ground in this part of the township. The indispensable supply of spring water was easily obtained from an old (though still water-bearing) beach, 110 feet above the "Algonquin." The most noteworthy feature of the site is a collection of shallow pits, or holes, in the ground. John Bell, of Waverley, estimated their number at 50, and regarded them as "warrior-holes." John Bannister, of the same place, made a similar estimate of their number. The latter, in company with a young doctor, dug into and examined one of these holes, and got a few burnt human bones. There are indications that they had been used for temporary sepulture, awaiting removal of the bones to some larger pit as soon as a "Feast of the Dead" should take place.

2. On the northeast quarter of Lot 73, Concession 1. W. H. Scarlett. Single graves, or empty caches, occurred at this site, confined to a patch of about two acres. Ashbeds were also to be seen, at which iron tomahawks and other relics were found, especially during the term of Daniel Day, who occupied this farm some years ago.

3. On the southeast quarter of Lot 73, Concession 1. T. Morrison. Iron tomahawks, beads, grains of Indian corn (carbonized with age), etc., have been found here. There were from 100 to 200 holes in the ground (similar to those described under the preceding numbers), some of them arranged in rows and cross-rows. These, or at least some of them, were probably graves of temporary use, as the finding of human bones is reported in connection with them.

4. On the northeast quarter of Lot 72, Concession 1. Robert Brown. Many iron tomahawks and other relics have been found here. Two clay pipes were given to Dr. R. W. Large, in 1892, and when his collection went into the Provincial Museum in 1897 these were included, and now appear as No. 16,719 and No. 16,720. (See 10th Archaeological Report, page 9). A cornpit was found at this site, and also shallow pits in the ground, similar to those described under the preceding numbers. One observer remarked that some of these were arranged in a circle. The abandoned beach at 110 feet above the "Algonquin" comes into the east end of this lot, and is water-bearing, and marshy here. The camps were situated on the high ground beside it, and were thus convenient to a supply of fresh water.

5. On the south half of Lot 72, Concession I. John Tweedale. Relics of various kinds, including iron tomahawks, have been found at this site. Enquiry at the next farm southward brought out the

fact that no relics occur on it except a few iron tomahawks, which have been found here and there, but do not indicate any village site. Tomahawks of this kind are frequently found on almost all the farms in this neighborhood, and are generally turned to various uses by the farmers. Since the advance in the price of iron, they are sometimes even sold to the scrap-iron dealers, who make regular visits to all the houses. The quality of the iron is first-class, belonging as it does to the period of French rule, 1615-50.

6. On Lot 69, Concession I. The west half of this lot was the original Archer homestead, and has been occupied for three or four years by Wm. Archer, jr. What appeared to be a small Huron burial ground, consisting of a few single graves, occurred at this site; but wherever there was any sign of a grave, curiosity-seekers had dug into it several years ago. The site extends into the east half of the lot, owned and occupied by Thos. McDonald. A few human bones and relics, including iron ones, have also been found on this part of the lot. The McDonald family settled here about 1860, and one of the members of the family (Mrs. Conlin, of Orr Lake) informed me that in the years immediately following their settlement they found a stone chisel, besides many pottery fragments and iron tomahawks. A small stream rises out of the "Algonquin" beach, near the site, and the "110 foot" beach also comes into the farm.

7. On the west half of Lot 68, Concession I. John Archer. (Edward Archer, sr., Hillsdale, being the owner). Iron tomahawks in considerable numbers have been found at this site. We have now reached the southeasterly corner of the first ridge. Between this and the next the land is flat and more or less swampy, the "Algonquin" beach passing through the narrow gap between the two. Within this lot, and near the site under consideration, is the narrowest part of the gap; and here, at the southerly end of it, there is a long gravel spit, or bar, built out across the old channel by the waves of former days. This bar is the watershed that divides the drainage of the Orr Lake district from that of the sources of one branch of the Hogg River; and along it (clearly because it gave the driest footing), the main trail of the Hurons seems to have passed, going from the higher ground, whose sites we have just been describing, to the next ridges.

II.—Sites on the Vasey Ridge.

8. On the east half of Lot 71, Concession 2. Thos. Jones. The occupants have found stone and iron axes, pipes, beads, arrowheads, etc., at a small site here, consisting of three or four patches of camps south of the dwelling-house. It is situated on a flat area on a very high hill. On almost every farm hereabout iron tomahawks have been found. Although the position of this village bears some resemblance to that marked Caldaria on Ducreux's map, it was, perhaps, too small to be a mission village.

9. On the northeast quarter of Lot 18, Concession 3. John Gawley. Many relics, especially pipes and iron axes, have been found here. On every farm adjoining this one, scattered relics, more particularly iron tomahawks, have been found.

10. In the line of the main trail a huckleberry marsh occurs on Lot 65, Concession 2, with its outlet toward the Sturgeon River. The trail probably passed on either side of this marsh, as Huron remains are abundant on both. On the northeasterly side there is a site on the west half of Lot 17, Concession 3. Franklin Bell. Villars Cripps was one of the first occupants of this farm, and found pottery fragments, pipes, iron tomahawks, etc., in abundance, especially when he cleared that part of the land on which the village was situated.

11. On the west half of Lot 16, Concession 3. Samuel Martin. On a hilltop which faces the Sturgeon River, and which occupies an angle on the westerly side of the outlet stream flowing from the huckleberry marsh, mentioned under the last number, pottery fragments and other relics, including iron tomahawks, have been found. The ashbeds of the camps are distinct. Gen. John S. Clark, of Auburn, N.Y., has called my attention to the fact that several names of Huron villages probably signify "lake," and he includes "Caldaria" of Ducreux's map in this class. He has partly worked out this idea in a valuable article on the word "Toronto," in the Ontario Archaeological Report for 1899. On this view of the meaning of the word Caldaria, I venture to give the opinion that one of the sites at this small huckleberry lake, or perhaps all taken together, is the one indicated by Ducreux. Numerous remains, which are chiefly assignable to the French or historic period, are (like those around Lannigan's Lake, in Tiny Township) quite frequent at this small lake, which is now almost dry.

12. On the east half of Lot 16, Concession 3. Its position is below the hill made by the "Algonquin" beach. Remains occur here beside the stream that flows out of the huckleberry marsh mentioned under the preceding sites. Iron tomahawks have been found, and some shallow pits were to be seen. A few of these were examined by two men, who formerly lived near the place. They found a few human bones.

13. On the east half of Lot 15, Concession 3. Duncan Barr and Chas. Todd. There are ashbeds and ashheaps here, near the left bank of the Sturgeon River. Clay and stone pipes, iron tomahawks, pottery fragments, and other relics have been found. On the same lot some shallow pits have been reported, which, on examination, yielded a few human bones. This place appears to have been at or near where the main trail crossed the Sturgeon River passing southeast to the next ridge.

14. On the east half of Lot 18, Concession 4. James Cowden. The usual pottery fragments, pipes, iron tomahawks, etc., have been found at this site.

15. On the west half of Lot 19, Concession 5. Camp sites strewn with many fragments and relics (including iron tomahawks) occur here. The edge of the hills passes through this farm.

16. On the east half of Lot 21, Concession 5. Samuel Hawthorne. Many iron tomahawks have been found on Mr. Hawthorne's land; and on adjoining fields, camps were to be seen at which the same and other kinds of relics have been found.

17. On the west half of Lot 22, Concession 5. Jas. Loney. Ashbeds strewn with the usual fragmentary relics covered a good space here. When the ground was dug for the foundation of the barn some years ago, ashes of the campfires, mixed with fragments of pottery, were found. There are indications that this was a village of considerable importance. The occupants of this farm have found iron tomahawks in considerable numbers. About 1863, when this district was covered with woods, Dr. Tache's workmen dug a bonepit near this place in a deep gulley, but the bones were too much decayed to take up. One of them informed me that they found kettles in the pit.

18. On the east half of Lot 21, Concession 6. Mr. Fallis. Here was found a bonepit of good size, and we are fortunate in having the statements of so careful an observer as Prof. Henry Montgomery, now of Trinity University, Toronto, to give in connection with the pit. Prof. Montgomery examined it in 1870, and again in 1876. In an article in The Toronto Globe, of Aug .3, 1878, he says:—

"One (ossuary) situated on Lot 21, Concession 6, of Medonte, is nearly circular, about 14 feet in diameter, and 8 feet in depth. A great depression was observed in the ground, it was suspected to be an Indian 'pit': the earth was removed to the depth of three feet, when an irregularly disposed layer of more or less flattened stones (chiefly limestone) was met with."

The present writer applied for some further particulars regarding it to Prof. Montgomery, who kindly added :—"I took more than twenty crania from (this) ossuary. . . . I would consider it quite impossible for any person to give you the exact number of crania. I made enquiries from settlers, but received no account of brass kettles having been found in the ossuary. I certainly found none. Nor did I find relics of any other kind here. The ossuary was about fifteen feet in diameter, seven feet deep, and circular in outline. Flat limestones were found over the skeletons. . . . The majority of the crania presented by me to the Toronto University were taken by myself from the ossuary in question." And again, in another letter, he says:—"With regard to the number of human skeletons (crania, etc.) in the aforesaid ossuary, I would venture to give 300 as a low estimate, and I have always thought there were many more than 300 in it."

19. On the west half of lot 21, concession 7, John Tinney. Here were found the remains of many camps. At the front of his land, in his garden, and near the road, Mr. Tinney found relics, in-

cluding iron tomahawks, a stone mortar, pottery fragments, pipes, Indian corn (carbonized by age), etc. While doing statute labor on the road near Mr. Tinney's gate a few years ago one of the workmen ploughed up some human bones among the Huron camps. The most notable feature of this site was a group of shallow pits or depressions in the ground, at a short distance from it. My attention was first called to these by James Davis, then of Coulson's Corners. Mr. Davis described them as "rifle pits," and considered them to have had their origin in connection with the war in which the Hurons were engaged. He had traced 140 of the pits about the year 1870, before the forest was cleared. In the year 1889 I made a brief inspection of them, having been guided to the place by Mr. Tinney, who had lived on this farm since 1876. They appeared to be irregularly distributed over the surface of the ground. But what I saw on that occasion, I should hardly describe as pits, although the land had been under cultivation for some years and the appearance of the surface had doubtless changed. The ground was uneven, and made so apparently by artificial means; but the irregularities might have been intended for cornhills, the Hurons having used very large hillocks for this purpose. The pits would thus be the depressions between the cornhills. Prof. Montgomery also noted these, and describes them in the following terms, in reply to my enquiries:—"Not far from this ossuary (see No. 18), perhaps half a mile,—then in the woods,—I found numerous artificial pits. These may be the pits referred to in your catalogue. My recollection would lead me to place the pits I found nearly to the east of the ossuary. . . . . They were mere shallow, circular depressions in the ground, but a few feet in diameter. Of the few examined, that is, excavated, most seemed to be barren as to skeletons and relics. But some Indian corn, entirely charred and in perfect shape, was found in one of them. I kept about a pint cupful of this corn in excellent condition for many years."

20. On the west half of lot 22, concession 7. Arthur Cowan formerly owned and occupied this farm. Pottery fragments, a stone mortar, iron tomahawks, and other relics were found in the rear of the farm.

21. On the west half of lot 23, concession 7. A large bone-pit was discovered here in 1869. It was opened in that year by ten men, including the following:—Jas. Davis (who gave me the first particulars of it), David Brolley (deceased), Robert Greenlaw, Jacob Belfrey, Sidney Robinson. They found it contained 440 skulls, besides other human bones; also brass kettles, two swords, iron tomahawks, etc. Many of the skulls had tomahawk or other marks upon them. A large pine tree, thought to be about 300 years old, had grown over the pit. Mr. A. C. Osborne of Penetanguishene informed me that he made some examination of it at a subsequent time. He says it was a large one, and it might have been associated with the village of Mr. J. A. Swan's farm, across the town line, in Tay Township, (see No. 29 in my Tay report), being

situated only about 60 rods south of the Tay and Medonte town line. Mr. Swan gives its position as at the foot of the hill-range; it had 500 or more skeletons, and two brass kettles were found in it.

III.—Sites on the Mount St. Louis Ridge.

22. On lot 53, concession 2. Francis Greenlaw. The camps are within, and on both sides of, the lane leading from the road to Mr. Greenlaw's residence, though perhaps the greater part are in the orchard along the south side of the lane. They occupy a plateau, irregularly circular, which I estimated, when I visited the place on May 17, 1901, to have a diameter of about 250 paces or yards. This plateau has a ravine along its southerly edge, and a branch ravine along its easterly edge for some distance. From my inspection of the situation of this village, I concluded that it was probably palisaded, and was important. The usual relics have been found here: but one iron tomahawk has been reported, their scarcity indicating that the site was probably an early one. Nearly all the clay pipes found at this site are of a noteworthy pattern. Clay

Fig. 30.

Fig. 31.

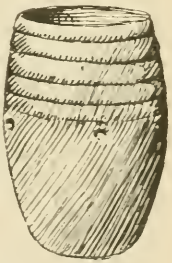


Fig. 32.

Clay Pipes of the Belt Pattern.

pipes bearing this design or pattern—a belt of grooves around the top of the bowl with a line of dots underneath them—are common on the village sites in this part of the township, and on sites all the way to Barrie and even farther south. For the sake of convenience I will call this style of pipe, the Belt pattern. One of the Huron nations, or rather, tribes, was known as the Cord (or perhaps Belt) "Nation," and as pipes often signified the clan or "nation" of the owner, I am inclined to think this kind of pipe indicated the cord or Belt "Nation"; though, of course, this is a mere conjecture on my part, and must await proof or disproof from subsequent research. (See figure.)

23. On the west half of lot 7, concession 4. Patrick Flanagan. This site is at the top of a very steep hill, 250 feet or more in height, at a distance of several rods southeast from the dwelling house, from which it is separated by a small ravine. Mr. Flanagan, sen., who cleared the land, informed me that it covered about two acres. When they first cleared the ground, there were surface

springs along the raised beach about 230 feet above the "Algonquin," but the water has lowered since the land was put under cultivation, and can now be found only by digging to a depth of twelve feet below the surface. There were thick deposits of ashes, in and near which he found many pottery fragments, pipes, stone axes, a copper or brass kettle (with a capacity of about six quarts), iron tomahawks, bone needles, etc. A pipe bowl found here appears to have been used for holding hematite paint after it had lost its stem.

24. On the east half of lot 10, concession 4. Cornelius Frawley. This village was romantically situated near the top of the ridge, which here attains a height of more than 500 feet above the Coldwater River in the valley along the southerly side of the ridge. Many pottery fragments and other relics were found in the ash-beds here. Mr. Houlihan, who formerly lived on this farm, had many iron tomahawks found at the site.

25. On the east half of lot 12, concession 3. John Macnamara. This site is in the woods, on a peak of land, on which the ground is quite stony. In company with James W. Fitzgerald, to whom I am indebted for much information in regard to the Huron remains of this interesting neighborhood, I visited this site on August 24, 1900, and saw evidences of occupation by early Indians at the edge of the hill, about twenty rods from the road. A shallow pit was noticed, perhaps an empty single grave or cache. On other occasions Mr. Fitzgerald had found many pottery fragments here, and once found a fragment of an iron or steel knife. In the ravine along the south side of the peak, a stream flows at most seasons, and this appears to have been the nearest supply of water for the village. The position of this site on a peak indicates palisading, prima facie.

26. The Probable Site of St. Joseph (II).

On the east half of lot 12, concession 4. Thos. Francis J. Fitzgerald. This is the most extensive village or town site in the district. Under the guidance of Jas. W. Fitzgerald I inspected it on Aug. 24, 1900. It occupies a level patch of ground of about fifteen acres, surrounded on three sides by gullies or ravines. Springs rise in the ravines on the north side, and unite to form a stream flowing into the Sturgeon River. Most of the soil on the site is very much blackened, indicating that the village might have been occupied for several years. It is strewn with fragments of clamshells, pottery, bones, and brass kettles, besides burnt stones, etc., while here and there artificial depressions or shallow pits are to be seen. The only cultivated part of the site at the time of my visit was a potato patch, in which the soil was everywhere black and mixed with pottery fragments, burnt stones, fragments of bird-bones, etc. At the easterly side of the village plot—the side that had no ravine—a trench of about fifty paces or yards in length was to be seen lying about N.E. by E., though it was not perfectly

straight, but slightly curved with its convexity toward the north. It was probably situated at the main gateway of the town, which doubtless had a palisade around it. While walking irregularly over the site I counted seventeen refuse-heaps; a very long one (thirty-three paces) occurs at the trench. The stump of an elm tree cut down on the site in 1898 showed 200 rings. A number of relics (chiefly metal ones) have been found at various times. These include iron tomahawks, iron knives and fragments, an iron or steel dagger, and other iron relics, besides clay pipes of varied designs, etc.

As might be expected, the mortuary remains found in connection with so large a site have been numerous. A small bonepit is reported to have been found many years ago on the south side; while near it a number of single graves were also found, and similar ones also southwest of the site. When examined, they yielded only bone fragments, the larger bones of the skeletons having perhaps been removed to some communal bonepit. But the burial grounds and bonepit of this large site was perhaps the Kinghorn pit, on the adjoining farm, and will be found described under the next number.

Before leaving this site, however, it might be well to append the following particulars obtained from John P. Hussey, the oldest resident in this neighborhood:—While Dr. Tache was here examining the Kinghorn bonepit, he also visited the large trench mentioned above. Some large pines grew at the place. Mr. Hussey found a portion of a large earthen pot or "cauldron" in the roots of an upturned tree; about a quarter of the vessel was unbroken. Through Dr. Tache it is now preserved in Quebec City, probably in the Tache collection at Laval University.

The corn patch of this site appears to have been on the rising ground in a northeasterly direction from it, and was quite extensive.

27. The Kinghorn Bonepit.

One of the largest bonepits ever found in the Huron territory was found a short way northwest of the last site, and was probably associated with it, but is situated on another farm—the west half of lot 13, concession 4, owned by Patrick Fitzgerald.

In order to get some clear ideas of the situation and surroundings of this pit, which gained, forty years ago, so much notoriety, I visited it on Aug. 24, 1900, along with Jas. W. Fitzgerald, who had formerly lived for several years on this farm. The ground around it is grey till or boulder clay, slightly modified by the action of water, and contains very little sand. The pit is now filled with stones, but it appeared to have had a diameter of about fifteen feet, so far as it was possible for me to decide by inspection after so many years. This diameter is not so great as that of a few others I have seen, but the accounts of eyewitnesses all agree in giving it an unusual depth (about eight feet). Such pits are usually in sandy soil, where digging was easy, but as the clayey nature of the ground here would enable the banks of a hole to stand upright for

a considerable depth, I can easily accept the extra depth assigned to this pit as a real fact. A large elm or maple tree had grown upon the bank of the pit.

At the time it was discovered (about 1856) the land on which it is situated (the west half of lot 13, con. 4) was the property of Richard Oliver, Barrie, father of Dr. L. Oliver of that town. Yet it was known everywhere as the Kinghorn pit, chiefly because the nearest settler then was Andrew Kinghorn, and perhaps also because Mr. Kinghorn, along with one Mr. Ennis, was the first person, as I have been informed, to dig into it.

As to the number of skeletons in the pit, or at least crania, one credible witness estimated 1,000, another 800 or 900, while another reckoned about 500 or 600. It would, accordingly, be impossible to choose any one of these figures as most nearly correct; we shall have to be content with saying that the estimates to which any value can be attached vary all the way from 500 to 1,000.

It contained various relics, besides the human bones. According to Francis Barr, whose wife is the only daughter of Mr. Kinghorn, someone found almost a bushel of wampum beads, besides a brass kettle and three copper ones. One of these kettles is deposited in the Provincial Archaeological Museum (No. 12,996), through the liberality of Major Joseph Rogers of Barrie, an iron handle having been attached to it since it was found. In the Toronto University collection another relic appears. No. 172, in the catalogue before the fire, was:—"Carved bone human figure, found along with red pipe mouthpiece, and piece of copper, in an ossuary in the Township of Medonte—S. Lount." Mr. Lount informed me that this relic was found in the Kinghorn pit. He estimated the diameter of the pit as sixteen feet.

Many persons of note visited the pit while it was one of the seven wonders. Two or three summer parties from Barrie did so in 1859, and some account of their trips will be found in the newspaper paragraphs quoted below. It was visited by Lord Edward Cholmley Dering and Lady when on their wedding tour, probably in 1862. Lord Dering was the eldest son of Sir Edward C. Dering of Surrenden, County Kent, England. John P. Hussey is my authority for stating that the Prince de Joinville was in the Dering party, and that he was making notes while there, but I have been unable hitherto to find any published notes by the Prince later than 1848.

No systematic examination of the pit appears to have been made until it was done by Dr. Tache, who (according to Mr. Hussey) visited this district for three successive autumns (about 1863-5) and examined it the first time he came. He opened it to the bottom, and took away the skulls that had escaped the curiosity-seekers.

The recollections of some of those who lived here in the years when the pit was a noteworthy feature are interesting; so we shall give a few of such as appear to be reliable. John Fitzgerald, sen.,

states that he found as many beads as would fill a pail, in the large pit; also that a piece of buckskin, about two feet long, was found; also a plait of human hair, interwoven with copper or brass. Here and there throughout the pit a burnt bone was found.

Patrick Flannigan, sen., says he saw skulls found in the pit, with sutures of such a kind that from his description I have no difficulty in recognizing them to have been Wormian bones. Such are common in Indian skulls, especially those of Hurons.

Mrs. Barr, whose estimates of numbers are characterized by caution, recollects that someone found half a pailful of wampum beads; someone also found a skull with a hole in it (it was probably drilled, such having been found in other pits). A wolf's head pipe bowl was also found. This is not surprising, as the wolf clan or tribe occupied the district in which this pit was placed, or else some contiguous territory.

Many smaller graves were found around the pit, chiefly by those who cultivated the land. Mr. James W. Fitzgerald, who knew the place well, informed me that he once dug 31 skulls from a small pit a few feet south of the main one; in this auxiliary grave there were only skulls—no other kinds of bones. Mr. Fitzgerald also pointed out some evidences of camps southwest of the pit, but the indications are not sufficient to enable us to arrive at any conclusion, as the relics found at the spot (consisting of pipes, iron tomahawks, pottery fragments, etc.) might have had some connection with the funeral rites of the greater pit. An old shore line, such as might furnish a village, if there was one here, with springs of water, crosses at a little distance north of the pit this west half of lot 13, diagonally, and runs into the west half of lot 12.

About a dozen shallow pits with human bones (mostly one skeleton or part of a skeleton in each) occurred immediately around the large pit. Then at a little distance from it, there appear to have been two other patches of single graves in the shape of shallow pits. The largest of these occurs almost due south from the main pit, on rising ground, or rather, the ground slopes gently away from this patch toward and beyond the main pit. It is partly situated on the same lot, and extends across the line into the adjoining lot 12 (west half). From an inspection of this ground, aided by Jas. W. Fitzgerald, whose recollection of the part under cultivation was of great advantage to me, I tried to make an estimate of the number of these single graves, and concluded that there had been at least forty. Dr. Johnson, formerly of Hillsdale, but now of Toronto, had made an examination of those in the part not under cultivation. West of these single graves and separated from them by some space is the other patch, which is almost wholly in lot 12, just across the boundary from the place referred to as the probable site of camps. Mr. Fitzgerald had estimated about 25 graves here; the ground has been cultivated for some years, and the exact number cannot be now counted.

The following extract from the pen of Dr. L. Oliver of Barrie appeared in The Barrie Advance of Aug. 10, 1859. At that time he owned the lot on which the pit was situated, and afterward sold it to George Caswell of Coldwater :—

Ascending the proud, disdainful steep (commonly known as "Barr's Hill"), we gained the Medonte Town Hall, and took an easterly (westerly) direction as far as Peter Riley's, turning north on the line leading to Mr. Andrew Kinghorn's, where the road suddenly ceased. We paid our respects to the old soldier, who received us heartily. . . . After due admiration, felt and expressed by the whole party [which included the county member (Angus Morrison), also Mr. Fraser, "our respected host of the Queen's Arms," and other gentlemen on an excursion in search of adventures. They were driven by Mr. Harvie, of Orillia, with his team] we proceeded, under the guidance of Mr. Kinghorn, jr., to some Indian mounds (?) in the vicinity, well armed with pick-axes and spades, to dig into these sacred repositories of an almost lost race. We give in the next paragraph our adventures,

"Down among the Dead Men."

On arriving at the spot, we selected one that had been previously partially opened up. Skulls and other bones were profusely distributed around the margin of the pit, the work of other Resurrectionists. About three feet from the surface of the ground the bones were deposited, which occupied a further depth of four feet, as thoroughly packed with human remains as it is possible. At about a depth of seven feet from the surface was a solid strata (stratum) of clay, thus demonstrating the depth of the excavation first made by the Indians. The area (diameter?) of this pit appeared to be about fifteen feet, almost circular in shape, but more inclined to the oval. We dug for several hours, and exhumed a sufficient number of skulls to make a graveyard stare. Pieces of copper kettles were hit upon occasionally, lined with deer-skin; and now and then a lock of hair, as natural as though sheared on the spot. We hit upon a few beads of coral, beautifully ornamented; though several had been previously obtained out of the same pit. No particular regularity could be observed in the distribution of the bones, though at times the skull, vertebral column, thigh and leg bones were to be found in seeming apposition. We, of course, each of us indulged a variety of conjectures as to the cause of such a multitude of dry bones in one sepulture, deposited there over two hundred long years, as witnessed to by the presence of a large maple tree immediately over the centre, whose roots were interlaced in every possible manner with the relics—thereby "hangs the tale." To imagine that disease, or war, accounted satisfactorily for their appearance there was not to be entertained, for the compactness and order observable in the arrangement of the bones, forbid the possibility that their bodies could have been interred with them: and the occasional patches of ashes and calcined bone would lead to the supposition that fire had been employed to destroy the soft

and easily decaying parts of the bodies. Then again, the deer-skin exhumed was easily recognizable, and just in that state of preservation that we might expect to find in some of the dense fibrous tissues of the human subject. On the other hand, it is characteristic to find these burying places with their surfaces much below the surrounding earth—in many cases some feet, although originally they must have been considerably elevated, and presenting the appearance of mounds. This would seem to argue that at one time the bulk of their contents were much larger than they now are; and that, in addition to the unerring force of gravitation, some chemical changes have been set up, reducing compound substances to simple elements, as we might suppose to be the case if the bodies had been buried intact. But this last speculation is scarcely warrantable, and it is idle to carry it further. It should be remembered, too, that the sepulchre we visited is not an isolated one, but that there are several others in the same township; and immediately within the limits of our town (Barrie) have they been discovered and emptied of their contents. In Nottawasaga and other townships, they have also turned up: and thus, being of such general occurrence, we may fairly conclude that these resting places of the aborigines of Canada have been duly consecrated and set apart in strict accordance with their ancient customs.

A little work on the "Discovery of America, and the Origin of the North American Indians" (by John Mackintosh; Toronto, 1836), in our possession, gives a chapter on their "Funeral Rites," which accounts satisfactorily for these masses of bones so closely packed together, an epitome of which we will reproduce for the satisfaction of our readers who are curious on this point.

Our author says:—"When a man dies in the time of hunting, they expose his body on a very high scaffold. . . . Every one returns to his own cabin; but the women come for several days after and pour sagamitty on the place."

This explains pretty satisfactorily the appearance of the burial-place as we found it at Medonte. Two centuries, at least, have rolled away since last these poor Indians were disturbed, with a prospect still of having to itinerate still further to gratify the curiosity of the white man. In the peculiar conformation of these Indian skulls we can trace faithfully the marks distinctive of them at the present day. They have lived their allotted time and fulfilled their destiny."

From The Barrie Northern Advance, August 10, 1859.

The Spirit of the Age (Barrie), August 10, 1859, had the following notice :—

Indian Remains.

A large pit of Indian remains has been discovered in Medonte containing several hundred skulls. As we intend visiting the place, we defer further notice until next week.

The issue of the same paper of date August 17, 1859, had the following article :—

INDIAN REMAINS.

The pit of Indian remains, noticed in our last, it seems, has been discovered some time, but its contents were not completely rifled until within the last week or so. During our visit of the 11th instant (Thursday), we finished the spoliation by exploring for several hours among the mass of bones and earth, but were rewarded for our trouble by simply finding some clay beads, very similar to short sections of a tobacco-pipe, a round stone, apparently used in some game, or perhaps as a weight, a small clay pipe, a piece of copper, to which was attached some beaver skin, and a single bead of rather a curious description, being of stone, or other hard substance, round in form, and measuring a little less than half an inch through; its sides stained in red stripes, something like the ordinary representations of a balloon. The pit from which these things were dug, is eight feet deep, and from fifteen to twenty feet in diameter, and has apparently contained at one time not less than seven or eight hundred skeletons. Surrounding the large hole are a number of smaller ones, arranged in circles, each containing two or three skeletons. These pits must be of considerable age, as the larger one had a maple tree four feet six inches in circumference, growing over a portion of its mouth, which, from the manner its roots and fibres penetrated into and among the bones, must have grown there since the pit was made. From the known practice the Indians had of collecting the bones of their dead every eight or ten years, and depositing them in one common receptacle, there seems little doubt but these pits had their origin in this custom. Since the Indians usually deposited their most valued articles with their dead, and the trinkets found among the remains are few in number and of little worth, we may conclude the tribe whose members are here buried were very poor.

28. On the east half of lot 15, concession 4. Francis Barr. Mr. Barr found pottery fragments, pipes, fish bones, clam shells, and other relics, among which were more than fifty iron tomahawks, found in patches on the farm.

29. On the west half of lot 14, concession 5. Jas. Loftus. The house and farm buildings occupy this site, which covers about two acres between shallow ravines, in which springs issue. Jas. Davis, who was the first to give me particulars of this site, stated that he saw an artificial mound of earth mixed with stones at the site before cultivation had obliterated the original marks. The bone-pit contained a hundred crania or a little more, according to his estimate, and in it two or three iron tomahawks were found. It was about eight feet in diameter. Francis Barr informed me that he was one of those who assisted Dr. Tache to excavate this pit about the year 1863. He thought that the number of perfect skulls found in it was about seventy-five or eighty. There were also some

isolated or single graves near the pit. He says there were as many as six refuse heaps at the site, which is distinct from another at the north part of this farm, described under the next number.

30. At the extreme northwest corner of the west half of lot 14, concession 5 (Jas. Loftus, owner), extending into lot 15 (F. Barr's), there is a small site, distinct from the last one. A few years ago Jas. W. Fitzgerald ploughed up thick deposits of pottery fragments here. A raised beach passes along at this place, and furnished spring water. In Mr. Barr's part, cornhills were to be seen, when the land was first cleared. He has found clam shell fragments, corn husks, and grains (carbonized), and other relics.

31. On the west half of lot 15, concession 5. Anthony Hughes. The Gore brothers cleared the land here, and were, perhaps, the first to find relics on the site. Various persons have since occupied the farm. The Gores found "skinning stones," pottery fragments, and a "pistol" on the site. Iron tomahawks in considerable numbers have also been found. Mr. Hughes estimates the ground occupied by camps at about two acres. On the higher ground east of the camp sites, Jas. W. Fitzgerald and the writer traced six or seven shallow pits or artificial depressions,—one of the usual features connected with places of Huron occupation in this part of the district.

32. On the west half of lot 10, concession 6. Geo. Miller. In a small field south of the farm buildings, the occupants have found pipes, pottery fragments, a bone needle, a deerhorn fragment, iron tomahawks, etc., in ashbeds. And on the next farm south, a few relics of the usual kinds have also been found.

Between this site and the next one, on lot 11, concession 6, near the boundary between the east and west halves of the lot, there is a very small earthwork of an unusual kind, in size about 20 x 40 feet. Some years ago Mr. Francis Barr dug into the bank at one end of this earthwork, for the purpose of examining it, and found a piece of sheet brass or copper. A human skull and other bones were exposed near it by the turning up of a tree; and other relics appear to have been found beside it.

33. On the east half of lot 11, concession 6. Jas. Barr. Mr. Barr guided me over this site, and its interesting surroundings, on May 9, 1900. Most of the pottery fragments and other signs of occupation have been found on a flat peak of land near the foot of the high hill at this place, the peak having been formed by one of the raised shorelines, with which the face of the hill is so completely terraced. It appears that no large trees grew upon this peak, at the foot of which a plentiful supply of good water could be obtained from the springs that issue here. Higher up the steep hillside may be seen another strong beach, or raised shoreline, which in many other places is a water-bearing beach, although just here I did not observe any springs along it. On the east half of Lot 12, on which Mr. Barr lives, he has found pottery fragments, etc., and when the land was first cleared, cornhills were to be seen in

considerable numbers. He has found altogether a dozen or more iron tomahawks (of early French make), chiefly on Lot 12 (on the high plateau near the Gloucester trail), but also part of the way down the hill near the peak first mentioned. In September, 1900, a son of Mr. Barr found one of these axes with straight lines cut into one of its sides, so as to make a rude design or pattern of an

Fig. 33. Iron Tomahawk, with design, probably cut by an Indian.

unusual kind (see figure). It turned up in a field near the old Gloucester Road. On some of the maple trees here tapped by Ojibway Indians, in Mr. Barr's sugar bush, fifty years or more ago, the old channels for collecting the sap are still distinctly visible.

34. On lot 14, concession 6. Jas. Burnfield. Mr. Burnfield has found pottery fragments, etc., chiefly at some ponds on his farm, with iron tomahawks in abundance; and once ploughed up a brass kettle in the adjoining lot (the west half of 15). A bonepit is said to have been once found near this site, probably on the higher ground south of the ponds at Mr. Barr's mill; but, although I have been informed of it by different persons, I have hitherto been unable to ascertain its exact position.

35. On the east half of lot 16, concession 6. Henry Heaslip. This site is large, covering an area of about five acres, and occupying a spur of land formed by a winding ravine. I first visited this site on June 12, 1889, and was shown over it by Mr. Heaslip. He has found on it grains of corn (carbonized), iron tomahawks, and other relics of the usual kinds. He showed me five bonepits, one of which, down in the ravine, was large and had copper or brass kettles in it. It is said to have been examined by Dr. Tache. Some of the four smaller pits on the high ground may have been single graves. The blackened camp sites showed quite plainly throughout Mr. Heaslip's field. Geo. Lee owns the easterly 25 acres of this lot, and he has found many remains west of the ravine mentioned above; and also east of it there are some ashbeds. On the farms adjoining this one, occasional relics are found, especially iron tomahawks. From the size and importance of this site, I am inclined to regard it as that of one of the villages at which the Jesuits had a mission, probably the one marked "St. Ignace" on Ducreux's map, which gives the locations of the missions as they were about 1640. This must be distinguished from the St. Ignace of 1649, the village which was captured by the Iroquois, and to which Brebeuf and Lallemant were taken, a few hours later, and tortured to death.

36. On the east half of lot 15, concession 7. Andrew Robertson. A water-bearing shoreline occurs near Mr. Robertson's house, at which numerous camps occur, and isolated graves in his orchard. A square piece of copper, or brass vessel, was once found in one of these graves. Mr. Robertson used to find, when the land was first cleared, pipes, pottery fragments, beads, etc. The old Gloucester Road, opened along the earlier trail, used to pass his house, but is now closed in this place.

37. On the east half of Lot 16. Concession 7. Richard Watson. A burial ground here, consisting of single graves in the shape of shallow pits, covered a considerable extent of ground. The camp fires of the village were not far distant from the burial ground; and throughout the fields, iron tomahawks have been found in abundance. Three parallel trenches, four or five rods long, and four or five feet wide, occur near the site; while a supply of spring water was to be found not far away. Sidney Boyd of the adjoining farm (the west half of Lot 16), found five or six single graves on his land, and relics with them, such as stone axes, pottery fragments, etc.

38. On the east half of lot 18, concession 7. Mrs. Janet McColl. The occupants of this farm have found arrow-heads (chert or flint), pipes, etc., but they report no iron tomahawks found on the farm. This absence of tomahawks is remarkable in this district, yet the same is true of the next site. The explanation may be that these villages were of an earlier date than the others in the same neighborhood.

39. On the southwest quarter of lot 18, concession 8. Thos. Sykes. Many camps were to be seen when he first cleared the land some years ago. These were found more especially in what is now the orchard, and near the dwelling house and other farm buildings. The most conspicuous feature at this site was the patch of cornhills, which covered considerable space, and extended across the public road into the land of Mrs. McColl. Mr. Sykes says he found no iron tomahawks, but found pottery fragments, pipes, etc. A water-bearing raised beach is beside this site.

40. On the west half of lot 19, concession 8. Neil Buchanan. Numbers of iron tomahawks and other relics were found here; and before the land was put under cultivation, many cornhills were to be seen. One of the villages marked "Arethsi" on Ducreux's map seems to agree pretty well with the position of this one. Nearly opposite this site, beside the Sturgeon River (on the land of Mr. Hamilton, lots 19 and 20, concession 7), there is a beaver marsh, as I am informed by Geo. McColl, who is well acquainted with the fishing and hunting grounds along the river.

41. On the east half of lot 20, concession 8. Geo. Lowry. The land hereabout is very stony. This farm was formerly occupied by Jno. Hopkins, who found various relics of the usual kinds when he lived on it. A bonepit was found on the opposite side of the public road, on Lot 21, formerly occupied by Robert Riddle, by

whose name the pit was often described. This pit, which was surrounded by ten or more smaller (probably single) graves, was large, having contained 200 crania at the lowest estimate, according to Neil Buchanan of the farm on which the last-mentioned site occurs. Mr. Buchanan once assisted Dr. Herriman, of Lindsay, Ont., to get two complete skeletons from the bones of this pit. Within the small portion of the pit dug by them, they uncovered 52 skulls; and by comparing this with the part unexamined by them, they readily concluded that the pit had originally contained a large number of crania. They also obtained earthen beads (some of a blue color), of European manufacture, a whole pipe, and some pipe fragments, pieces of brass kettles, pieces of fur, etc. The pit had been examined to some extent by Dr. Tache and his workmen, who, it is said, got kettles out of it.

42. On the east half of lot 22, concession 8. Wm. Greatrix. This site is beside a stream that flows into the Sturgeon River, and appears to have been that of a village of some importance. Iron tomahawks and other relics have been found at it.

43. On the east half of lot 18, concession 8, at what is known as "Moore's Clearing," though nobody now lives at the place. The refuse mounds and ashbeds of the village are near the raised beach 110 feet above the "Algonquin." Near the site was a very large bonepit, found many years ago. Brass kettles, rings, wampum, and other beads, etc., were found in it. Dr. Tache's men opened this pit, and one of their number (Cornelius Frawley) informed me that they found a finger-bone with the ring still upon it; also an ossified backbone, not curved, as is frequently the case with tubercular spines, but straight.

44. On the east half of lot 22, concession 9. The Swaile homestead, now occupied by Mr. Brandon. A large bonepit here was examined by Dr. Tache. A village site of the usual description occurs near it. The position of this site resembles that of St. Joachim, as marked upon Ducreux's map.

45. On the west half of Lot 16, Concession 10. Theophilus Moon. This is a small site, at which Mr. Moon has found the usual relics, including iron tomahawks.

46. On the west half of Lot 17, Concession 10. Mr. Hill. It is at the west boundary of this lot, and extends across the public road into the 9th concession. This village occupied the top of the hill at the "Algonquin" beach, along the bottom of which are found the usual springs. Ashbeds are numerous at it, mixed with pottery fragments, and several iron tomahawks have been found.

47. In an easterly or northeasterly direction from the last site, some shallow pits were to be seen, on or near lot 18, concession 10—on a lot that was formerly part of the Routledge farm. Dr. Tache and his men made an opening into a bonepit near these, but found the bones in it too much decayed by the wet from the springs to be removed.

48. On the west half of lot 20, concession 10. This is the Fox farm, with its now celebrated village site, so widely believed (though erroneously) to have been St. Ignace of the Jesuits. Father Martin described it in the folowing terms, as he found it in 1855. (See his "Life of Father Jogues," Appendix A) :—

"There were two villages called St. Ignatius—the onejust mentioned, about five miles from St. Mary (on the Wye): the other, known in Indian as Taenhatentaron, was near the Iroquois frontier, between Teanaustaye and Cahiague. We are inclined to think that its site was on lot 20, concession 10, of the present district (township) of Medonte. Many Indian remains have been found there, pipes of various kinds, collars of all varieties (wampum beads from belts or 'colliers' ?), fragments of vessels (pottery), and more than two hundred iron hatchets of French make. We visited near it one of the great Huron graves, such as Father de Brebeuf describes in detail in the Relations. It is a great circular pit, about five yards in diameter, in which great numbers of bones are still to be seen. When it was discovered in 1844, kettles, pipes, collars (wampum ?), fragments of peltry,—the usual articles used in these solemn burials,—were found there. This town was abandoned from fear of the Iroquois, and removed nearer St. Mary, in 1648, as we have said. It is the one shown on Ducreux's map, on what is now called Sturgeon Bay (River ?)."

Father Martin here clearly distinguishes between the earlier and the later St. Ignace. But not so Dr. Tache, whose view is given by Parkman in the following footnote to "Jesuits in North America" (p. 386) :—

"The site of St. Ignace still bears evidence of the catastrophe, in the ashes and charcoal that indicate the position of the houses, and the fragments of broken pottery and half-consumed bone, together with trinkets of stone, metal, or glass, which have survived the lapse of two centuries and more. The place has been minutely examined by Dr. Tache."

It is a little amusing to find a claim made that this pottery was broken in the catastrophe of 1649. It is not in the least strange, however, that forty years ago the fragments should be taken as evidence of some catastrophe. But it should be remembered that on every one of the 75 sites described in this Report, pottery fragments are common, and, accordingly, they can furnish no proof of the manner in which the village came to its end. Nor does the evidence on the other points mentioned make the proof any more conclusive. In fact, it is doubtful whether this site represents any of the mission villages, since Ducreux's map sets them all down facing the Sturgeon River, whereas this village overlooked the Coldwater River.

J. P. Hussey informed me that, among other things, Dr. Tache found a cache of Indian corn at this site. The corn was surrounded with rush mats, then with hide, and stones were underneath it.

C. A. Hirschfelder once informed me that he had obtained some good relics from this site. As his collection is now in the Museum of the Geological Survey at Ottawa, and as some of them are marked "from Medonte," the relics referred to can perhaps be seen there.

The late Rev. J. W. Annis also visited this site and obtained some relics. His collection is now in the Ontario Archaeological Museum at Toronto.

IV.—Sites on the Coulson Ridge, etc.

At the south side of the township a few village sites are found along the edge of the high ground, which becomes still higher in the adioining parts of the Township of Oro, where many sites occur, and require a detailed survey by themselves.

49. A forest trail connected the Hurons with the Neutrals at the west end of Lake Ontario. About the place where this trail probably reached the high ground along the south side of Medonte, after crossing the valley of the Coldwater, rather after passing the flat ground where the Coldwater River has its sources, there was a village of some importance. Its site is on the farm of Thos. Higgins, the east half of lot 42, concession 1, near the sources of a stream known as the Forty-six Creek.* A seven-acre field contains the whole of the site, and throughout the field the usual relics have been found. Many bones were found, some of which were those of human beings. Mr. Higgins once found an iron tomahawk, and other tomahawks are occasionally found in this neighborhood. One of his sons found another small iron article; all of which indicate that the village belonged to the French period, but probably not the last part of it.

50. Some indications of a site occur on the west half of lot 2, concession 3, where pottery fragments, pipes, etc., have been found. The land is now tenanted by Isaac Greaves, but was formerly owned by John McKinnon. Strong springs issue along the raised beaches in this farm, as well as in the east half, owned and occupied by Jas. Rix, to whom I am indebted for having called my attention to the remarkable force and coldness of these natural fountains. After uniting, they make rapid streamlets of clear, cold water, which flow together and are the sources of the Coldwater River. The coldness of these numerous streamlets is probably the origin of the river's name.

51. Continuing eastward along the edge of the hills, one finds a village site on the east half of lot 1, concession 4, which was formerly owned and occupied by Thos. Hamilton, but is not now occupied. On a flat shelf of ground that covers several acres, well up on the hillside, in a northeasterly direction from the now vacant house and farm buildings, Mr. Hamilton found many relics and fragments, also pieces of bones, some supposed to be human bones.

* So named because it crosses the Penetanguishene Road in Lot 46. This stream flows into the larger Willow Creek, which in its turn is one of the feeders of the Nottawasaga River.

The occurrence of a few iron tomahawks is reported. Strong springs of water issue near the site, like those to be seen elsewhere along these northerly flanks of the hills, facing the Coldwater River.

52. On the east half of lot 3, concession 5, (Jesse Shelswell's) extending across the public road into the west half of lot 4, concession 6. The latter farm was formerly occupied by the late Wm. Leith, who found various indications of camps, including mortuary remains.

53. A well-known site of average size occurs on the farm of Mr. Cook, the west half of lot 1, concession 6. Many relics have been found in ash beds, in two places, separated by a gulley through which flows a small stream. One of these patches occupies the top of a point between two ravines, and from its position one would conclude that at least this part of the village had been palisaded. The relics comprise pipes, stone axes, beads, bone awls, etc., but none have been found to indicate with certainty the presence of early French traders. A human skeleton, with a clay pipe in its teeth (according to the account of the finder)—No. 16,335 in the museum—was once discovered. This site was mentioned in paragraphs in The Barrie Gazette, April 27, and Sept. 7, 1887, both of which are known to have been written by the late F. C. Whitelock, teacher at Coulson School, and in company with whom I examined the site, Aug. 27, of that year. Although "knives" are reported in one of The Gazette paragraphs, iron relics as such are not reported to have been found, nor are any remembered by members of the Cook family. Some clay pipes of the Belt pattern (see figure and description under No. 22) have been found here.

54. Three small sites occupy an isolated hill or large knoll in the valley of the Coldwater River. This hill had been a small island in the times of the "Algonquin" lake or sea, and it is encircled by the old shore-line, along which springs of fresh water issue here and there, making a plentiful supply for the aborigines. The first of these sites is on the east half of lot 7, concession 7. Wm. Douglas, owner; Frank James, tenant. The black soil and ashes of camp fires were found at a place where water was easily got. On these camp sites, pottery fragments, pipes, flint spear-heads, stone axes, and other relics were found; but no iron relics, so far as those persons remember, who found relics here. In 1889, when I first visited the place, a grove of second-growth pines had grown up since white settlers first cleared the land, but these had also been cleared away by 1900.

55. On the east half of lot 8, concession 7. This site is near springs of water, but is small. Pottery fragments, iron tomahawks, pipes, stone axes, etc., were found at it.

56. On the west half of lot 8, concession 8. Wm. Hawkins. This site is small, covering altogether a patch of perhaps 50 square yards. It is situated about 20 rods from a supply of spring water. Pottery fragments, pipes, etc., were found at it.

57. On the west half of lot 4, concession 10. Nicholas De Hart. This site is on the terrace at the foot of a hill, near the Algonquin Beach, which is water-bearing here, as in so many other places. Some years ago it was frequently examined by Archibald Reid, who picked up numerous pottery fragments, stone axes or chisels, a bone awl, or skewer, and other relics. There were some artificial holes or depressions at the place.

58. On the northeast quarter of lot 7, concession 10, George Duddy. A good many years ago, elder members of the family found a few pipes and other relics in one patch at the westerly edge of the level ground. This spot is in the rear of the farm, and just over the hill from it may be seen the Algonquin Beach, with its springs of fresh water.

59. On the east half of lot 5, concession 11. Walter Brechin. Some pottery fragments and other relics have been found just behind the farm buildings, but the extent of the ground covered by these camps does not appear. There are also signs of ashbeds in a field across the road. The site is near a hillside, overlooking that branch of the Coldwater River known as the Avon River.

60. On the west half of lot 4, concession 12. Archibald McKinley. A gulley or branch ravine from the valley of the Avon River runs into this farm, and the site is on the hilltop beside the gulley. The relics found here consist of pottery fragments, "skinning stones," pipes, etc. No iron relics are reported.

61. On the northeast quarter of lot 4, concession 12. Thomas Welsh. Some years ago, when the ground was first cleared, this site yielded more relics than it does now. The farm at that time was owned by Patrick Lawlor. It appears to have been a village of considerable size. When I visited this place in 1887, in company with Mr. J. C. Rose of Orillia, mounds of black, mellow soil (probably refuse heaps) and artificial holes in the ground were to be seen. The place was strewn with fragments of pottery, fishbones, clam shells, etc., in considerable quantities. A circle of stones is reported as having existed at the site when the land was first cleared. It is near the sources of the Avon River, and springs of fresh water are numerous at its easterly side.

62. On the northeast quarter of lot 3, concession 13. Matthew Thornton, who owns and occupies this farm, has found pottery fragments, pipes, iron knives and tomahawks, etc.—the usual relics of a village site—at the north edge of his land; and Mr. Abbott of the adjoining farm (lot 4) has also found similar relics near the same place.

63. On the southeast quarter of lot 3, concession 13. David Hewiston. Some pottery fragments and other relics, including a copper or brass kettle, have been found here, indicating a few camps.

64. On the west half of lot 3, concession 14. John Teskey. The farm was owned and occupied at the time of the discovery of the large bonepit here in the spring of 1856, by Michael Braden,

who first cleared the land. Rev. Dr. Gray of Orillia sent some of the relics from this bonepit to Dr. Daniel Wilson of Toronto University. The finding of human hair in the pit is well authenticated by several eyewitnesses. On June 20, 1900, when I visited the place, Mr. Teskey, the owner, informed me that at a spot about 250 yards from the pit, near the bank of a stream, he had found single graves and relics, such as pottery fragments, etc. Several printed articles describing the pit have appeared. These are worth reprinting, some for their quaintness, if for no other reason. Strange to say, only one of these accounts has any suggestion of its true Huron origin between the years 1615 and 1650.

From the Barrie Advance, of Oct. 9, 1856:—

Indian Remains.

Mr. P. H. Hough (pronounced Howe), school teacher, North Orillia, informs us that near his residence a large grave was recently discovered, in which were found about 200 human skulls, with other bones, and a variety of ornaments, such as beads, etc. There were also 15 copper kettles, of different sizes, the largest of which is about two feet in diameter, and would hold about four common pails full. These articles are in the most perfect state, and the hair yet holds in small particles to the skulls, whilst lumps of it are intermixed with the heap. The grave was about twelve feet wide, and six feet deep, and was completely filled. No one in the neighborhood has any knowledge of the circumstance which placed them there; and it would be a matter of interest to be informed as to how such a number could have been collected into a spot which the Indians have not possessed for at least a quarter of a century. We are not sufficiently acquainted with the history of that section of our county to risk an opinion, and would most readily give publicity to the views of those who are more competent to do so. Our informant also furnished us with a poetical composition upon the discovery—more, as he states, for the purpose of prompting inquiry than that of making public his own merits. We therefore forego publishing it, as being too long for our available space, and trust our previous observations will elicit the information desired."

The following article, from the pen of Rev. Dr. Gray of Orillia appeared in The Toronto Globe of Oct. 20, 1856 :—

Indian Remains.

The elevated ground that lies between Lakes Simcoe and Huron* seems to have been, in former ages, a favorite home of the Red Man. Abounding with numerous valleys, and studded with hills of various sizes, it has formed an admirable field for those sudden surprises and those stealthy attacks that distinguish Indian warfare. From its central position, it was probably a battle field for

* The old name of Georgian Bay.

the hostile tribes residing in Canada on the one hand, and the north-western nations on the other. This advantageous position of the district was discerned by the military genius of Sir John Colborne, who, with his wonted sagacity, foresaw that only amid those glens and wooded heights could a successful resistance be made to an invasion (which may God forever avert!) from the neighboring States. He accordingly matured a scheme for settling the district with military colonists, and establishing a chain of Indian settlements along the line of portage that connects Lake Couchiching and Georgian Bay. Various circumstances, however, prevented his plan from being successfully carried out. This whole section of country is studded with Indian remains. In many places Indian burrows have been discovered, containing the remains of dead bodies, pottery, copper kettles, pipes and other articles peculiar to the Red Man. And a few years ago, a farmer in the Township of Medonte found the remains of a small manufactory of pottery, in which were utensils of all kinds and sizes in various states of preparation. The writer of this has visited the spot. It lay on the side of a rocky eminence, and resembled one of those limekilns so common throughout the Province. Occasionally, too, the settlers stumble upon a burrow, and make strange discoveries. About six miles from Orillia the North River crosses the Coldwater road, which runs on the old portage between Lake Couchiching and the Georgian Bay, and forms a natural valley with low heights on each side. On the northern height, about a quarter of a mile from the road, an Indian burrow was found last spring. Perhaps our readers may understand by a burrow a raised mound of a peculiar shape, but such is not the case. It is merely a slightly depressed hollow, of an oval shape, about ten feet deep, as many in length, and about eight in breadth. Sometimes it is difficult to distinguish it from the depression caused by the roots of a fallen tree. The discoverers of the burrow a day or two ago resolved to open it. Removing the surface earth, they came upon layers of bones in various stages of decay, and near the bottom they found a number of copper kettles, two large shells, some beads made of bone, and a quantity of hair. No pipes or tomahawks were found. The number of dead interred there must have been at least from 150 to 200, as one individual counted no less than 70 skulls that were thrown out, exclusive of those left in the burrow. The kettles are of superior workmanship, of various sizes, in excellent preservation, and tastefully formed; all of them have had iron handles, some of which are much corroded or entirely gone. A few have rims of iron, very much decayed around their tops. The beads are coarsely and inelegantly made. The shells are those usually found in such places, and are much worn. As Professor Wilson has lately shown in The Canadian Journal, they must have come from the Gulf of Mexico, and thus exemplify the existence of an extensive traffic between the northern and southern portions of our continent. The presence of the hair is involved in mystery. It does not belong to any of the skulls but

seems to have been either a talisman or an ornament. While standing amid the debris of decaying bones and mouldering skulls, the question naturally arose: "Who and what were those? What were their joys and sorrows, their occupations and pleasures? How did they come to an untimely end, and how long have they lain in their earthly resting-place, till disturbed by the insatiable curiosity of the white man?" Alas, from those grinning skulls and those discoloured bones, not even the voice of echo is heard. Perpetual silence mocks all our inquiries. Without presuming to offer any very decided opinions, the writer is inclined to believe that the remains are those of warriors, slain in battle. The chief grounds for this are as follows :—

(1) In the spring a skeleton was found at a short distance from the burrow, with every evidence of having been struck down by a tomahawk.

(2) The height, where the remains were found, is one admirably fitted for a battle-field.

(3) The bodies seem to have been hastily interred. Most of them had on their ordinary dresses. A few remains of these were found with the fur yet perfect, the skins neatly sewn, and the fringe-like ornaments peculiar to Indian dresses, still distinct and undecayed. The corpses appear to have been hastily thrown in, and little or no earth thrown over them, as the only covering found over them, was that formed by the accumulation of leaves that have fallen since their interment. The time when this interment took place will never be known, but it must have been after the French began to occupy the country.

The following comments on the foregoing article are from the pen of the late Sir Daniel Wilson:—

From The Canadian Journal, N.S., 1856. Vol. 1, p. 554:—

The principal facts contained in the following notice of the discovery of Indian remains in the vicinity of Orillia, County of Simcoe, accompanied with tropical marine shells, and copper and other relics, are derived from an account in a recent number of The Toronto Globe (Oct. 20, 1856). Indian mounds (pits?) have been repeatedly opened in that neighborhood; and we have in our possession crania and sepulchral relics found in one of these, which was explored in 1854. One of the skulls betrays unmistakeable evidence of the stroke of the tomahawk with which the old Indian met his death. The relics in the present case, however, have been found in hollows, to which it would appear the term "Burrow" is applied: probably as a distinctive variation from that of the old Saxon Barrow, or Sepulchral Mound.

Some of the beads have also been described to us as of glass coarsely made: and the shells appear to have been specimens of the large tropical pyrulae, repeatedly found along the shores of our northern fresh-water lakes, furnishing unmistakeable evidence of an intercourse carried on with the Gulf of Mexico or the regions

of Central America. In the present case the accompanying relics appear to indicate no very remote date for the sepulchral depository. From the iron rims and handles of the vessels, and the glass beads, they must at least be assigned to a period subsequent to the intercourse of the Indians with Europeans; and the remains of some of their fur wrappings indicated a much shorter interval, since their deposition.

The writer in The Globe, while hesitating to offer any very decided opinion, is inclined to believe that the remains are those of warriors, slain in battle. The chief grounds for this view are stated as follows:—(Quotes the three reasons found at the end of the article mentioned.)

The relics, however, with which these human remains were accompanied seem irreconcilable with this view of the case. There was not only an absence of weapons of war, which we cannot suppose would have been entirely removed, when such objects as copper kettles and the cumbrous tropical shells were left, but the latter are not objects with which a war party would be likely to burden themselves. The so-called burrow was more probably an Ossuary, into which the remains of the dead were promiscuously heaped, in accordance with known Indian customs, after the final honors and sacrifices had been rendered to the deceased. One of these Ossuaries, in the Township of Beverly, from which specimens of the same class of tropical shells were procured, has been noticed in this Journal (Old Series, Vol. III., p. 156). The depression by which the locality of these recently discovered relics was indicated, is no doubt mainly ascribable to the decay of the human remains interred there. Dr. Schoolcraft speaks of some of these cemeteries as "Sepulchral trenches or Ossuaries, in which the bones of entire villages would seem to have been deposited"; and the appearance of hasty and partial inhumation described above has been noted in other examples.

The locality where these relics have been found appears to present a rich field for investigation; and it is gratifying to find such discoveries meeting with the attention evinced on this occasion. The narrator of the above facts observes:—(Quotes the first part of the article mentioned.)

As no knowledge of the potter's art seems to have survived among our northwestern tribes, an account of the discovery of this native potter's kiln, with a minute notice of its contents, and the condition in which they were found, if still recoverable, would be well worth putting on record.

In an article by the late Sir Daniel Wilson on "Some Ethnographic Phases of Conchology," published in The Canadian Journal, Vol. III., p. 399, (New Series, 1858), he makes the following further reference to this bonepit:—

"About six miles from Orillia, where the North River crosses the Coldwater Road, which is on the line of the old portage be-

tween Lake Couchiching and the Georgian Bay, it runs through a valley, with low heights rising on either side. On the northern height, about a quarter of a mile from the road, the Indian relics now referred to were found. Many skeletons were disturbed, and along with these were numerous specimens of native art, beads and other ornaments of bone, some curious rings made from the vertebrae of the sturgeon; and also glass beads and copper kettles, some of the latter with handles and rims of iron. Beside these miscellaneous relics lay two of the large univalve shells of the tropics. In this, as in the former cases, the traces of European art fix the date of the deposit at a period subsequent to the discovery of America by the Spaniards, and in all probability to the explorations of the French among the Hurons of this district in the early part of the seventeenth century."

From The Orillia Packet of Dec. 2, 1892:—

"Shortly after the close of the Russian war, an ossuary was opened on the farm then owned by the late Michael Brayden, now the property of Mr. John Teskey, the west half of lot 3, in the 14th concession (misprinted '11th' in the original) of Medonte. Mr. Brayden was then in California. The ossuary was discovered by Messrs. William and Henry Overend, who observed a large, round depression, which they supposed had been dug out, and the latter removed the leaves and mould with his fingers, until he felt what he believed to be a crock. They then obtained spades, and with the aid of Mr. Harvie Chisamore, dug up seventeen copper kettles, capable of holding from six to fifteen pails of water each. The kettles were well preserved, except that the iron bails were somewhat rusted. The settlers used the kettles for sugar-making years after. In the kettles were scores of skulls and bones, some of them of men of great height. One skull had two rows of teeth. There were no weapons of war, and none of the skulls bore marks of the tomahawk or other indications of violent death. Large quantities of hair, wampum and beads were found. Also two conch shells, supposed to be from the Gulf of Mexico, were among the things dug out. The beads were of copper, bone, and some of shell, strung on some kind of sinew, which was rotten. The hair was in little packages, wrapped in birch bark and bound with pieces of hide. Mr. Henry Overend estimated the skulls at from seven hundred to a thousand in number. The kettles appeared to have been hammered out of a solid piece of copper."

65. On the east half of lot 3, concession 14. H. Wright. In the most westerly field of this farm, and adjoining Mr. Teskey's land, on which the last-mentioned site with its bonepit occurs, considerable quantities of relics were found by the late George Wright, more especially when he cleared the land many years ago. His son, Harry Wright, is now the occupant of this farm, which is on the line of the Coldwater Road (once an Indian trail), where it crosses the North River.

66. On the east half of lot 1, concession 14. Price's farm. On a gravelly knoll, in a northwesterly direction from the dwelling-house and farm buildings, Mr. Price, jun., found some pottery fragments, and other relics, including an iron tomahawk, all which indicated a few camps.

67. On the west half of lot 8, concession 12. Duncan Mathieson. There have been found at this site the usual pottery fragments, pipes, "skinning stones," etc. It is near the source of Purbrook, a feeder of the Coldwater River.

68. On the west half of lot 9, concession 13. Joseph Overend. At this site the occupants have found three or four iron tomahawks, three or four "skinning stones," a mealing stone, or mortar, some iron arrow points, pipes, pottery fragments, etc. There were several empty holes (arranged in a semi-circle, or half-moon), one of which had stones around it. These had probably been used as food caches, or were perhaps temporary depositaries of dead bodies, awaiting removal to a larger bonepit.

69. On the west half of lot 9, concession 14. Thos. Murphy. A large bonepit was discovered here in 1867 by Michael Thornton, of Warminster, who furnishes the following account of it :—There were found in it about 300 skeletons, a brass kettle, a copper kettle, a metal bowl (something like a "teapot"), glass beads, wampum beads, an entire conch shell, pipes, etc. Beside this pit there were two isolated graves, each containing a skeleton. The second person to examine it in 1867 was Joseph DeClare, Warminster, who supplied the following data :—The skeletons (those on the bottom of the pit, at least) were regularly arranged with their feet toward the centre of the pit. (Compare this with the mound on Tidd's Island, in the St. Lawrence River, First Archaeological Report (Boyle), 1887, p. 10). Beads were found around the necks of many of these. The indications were that some bodies, with flesh still on the bones, had been buried in the bottom of this pit, unlike the usual practice in connection with bonepits. In 1885, an antiquarian from Toronto, whose name had been forgotten by our informant, engaged laborers and made a thorough examination of the pit. But he found very little, except a few beads, as everything in the line of trinkets had been previously dug out. At the village itself, which is situated at a distance of about forty rods from the pit, iron tomahawks were found in great numbers. This village was situated on high ground near a small stream that issues from springs at the foot of the hill. The soil in some places is sandy, and gravelly in others. Many holes were visible in the ground when I visited this place on August 25, 1887, in company with Mr. J. C. Rose, of Orillia, at which time the farm was in the possession of Eugene Sullivan. But in none of these holes were bones found. Some of the holes were arranged in rows. A smaller bonepit, however, is said to have been found quite near the village site.

70. On the west half of lot 10, concession 12. Robert C. Hipwell. In and round about the garden the occupants of this lot

have found pottery fragments, pipe heads, a stone axe, etc., but no iron relics have been reported. This farm was originally settled by Commander Steele, R.N., and called "Purbrook" by his family. Commander Steele was the member of the old Canadian Parliament for the County of Simcoe, 1841-4, and for some time was Colonel of the militia of the county. His son, Lieut.-Col. S. B. Steele, had the command of Lord Strathcona's Horse in South Africa.

71. On the east half of lot 11, concession 11. Chas. W. Nelson. The owner and his family have found pipes, pottery fragments, "skinning stones," an iron tomahawk, etc. Mr. T. F. Milne received a few relics from them in 1892, and these passed into the Provincial Museum with his collection, in 1898. They include a clay pipe (17,125) and "a small and well made celt" (17,140). This farm was originally settled by the Rev. George Hallen, rector of St. George's, Medonte, and after 1840, the resident clergyman at Penetanguishene.

72. On the west half of lot 12, concession 12. John T. Graham. Relics have been found here similar to those found at the last site. A pit of bones, or grave, was supposed to be here, but on examination it did not prove to be one.

73. On lot 16, concesison 12. Jas. Brownlee. Wm. Orr, of lot 17, on which the next site is located, ploughed up thirteen iron tomahawks all in one heap at the site on this farm. There is a place here with so many pottery fragments that it resembles, or would suggest, a pottery factory. The site was probably Algonquin, of later date than the Hurons.

74. On the west half of lot 17, concession 12. Wm. Orr. They have found here pottery fragments, pipes, iron tomahawks, stone axes, knives (iron or steel), and a dagger or bayonet. A graveyard of single graves is said to have been found here also. The camp sites occur beside the "Indian Hill Road," i.e., the original Coldwater Road or Trail. Mr. Orr found three "Indian cents" with old date. Indian houses were built along the Coldwater Road about 1830 at this place, as elsewhere. Like the preceding site, it was probably Algonquin of later date than the Hurons.

75. Various Indian remains have been found at Coldwater Village, where the trail from the Narrows of Lake Simcoe, near Orillia, had its northerly terminus. The landing was near the line between lot 22 and lot 23, in concession 12. Lawrence Heyden informed me (in 1899) of a small brass cross (double-barred, or Lorraine pattern), that was dug up in a garden at Coldwater, and, in response to my enquiry as to this relic, Wm. Teskey, of Orillia, informed me that he found it in a lot adjoining the Orange Hall, in the year 1880. It bore on one side the figure of a dove, above which were stamped the letters I.N.R.I. The lowest rapids on the Coldwater River are now found at this place, and water-mills are in operation here. This may partly explain how the Indian village

and landing place had its origin, as the land hereabout rises a little, while lower down it becomes swampy. It does not appear, however, to have been necessary to make a portage past the rapids, in early times, at any rate, since J. C. Brokovski, who is well acquainted with the district, informed me that according to the oldest residents one could formerly go up as far as Lot 15 (Boyd's Corners) in a canoe. As the land here is nearly at the present level of Georgian Bay, it is probable that no Hurons camped here, because in their time the water stood at a higher level than now. Storms from the northwest also raise the water level in the long arm of Coldwater Bay. It is probable, therefore, that this site was altogether later Algonquin, belonging to the period after the water had receded.

NOTES ON N. VICTORIA.

By Geo. E. Laidlaw.

The undermentioned persons must be thanked for their donations of relics and their aid and assistance during this season:—

Large flint blade, from Mr. Michael Byrnes, lot 1, con. 6, Carden Tp., found on the boundary near north bank of the Talbot River. Dimensions: 9 inches long by 2⅝ broad and ⅜ thick. Material, dark grey translucent quartzite. Slender stone pick, from Jas. McGirr, P.M., Balsover P.O. Found by Wm. Freeland, near the Portage Road, Thorah Tp., Gamebridge P.O. This artifact is long and slender, of diorite, with smoothed surfaces, oval, oblong in cross section, one end damaged. Present length 10 inches, original length probably 11½ inches, width 1 13-16 inch, thickness 1 inch. The back is somewhat rounded.

Stone knife or scraper, given by S. Truman, site No. 9, lot 22, con. 8, Eldon Tp. The edge is on one side; one end is damaged. Has the appearance of the ends being shaped as if to form handles. Present length, 9 13-16 inches. Length of cutting portion, 4 inches. Width of blade, 2 inches. Greatest thickness on back, ⅜ inch. Piece of brass from same lot, slightly sharpened on edge: (questionable aboriginal article).

A large iron French axe, from lot 15, con.. 8, Eldon Tp., donated by Mr. A. Ferguson, Glenarm P.O., has been reduced by aboriginal methods to present size. Unlike Fig. 79, p. 51, Arch. Report for '91, this one had a slice from the lower portion of the blade removed, ends of two long cuts, one on each side, and a cross cut at the bottom remain to show how this was done. This axe bears the same maker's stamp as far as can be made out, as Fig. 79.

Small stone celt, N.P.R., lot 3, Bexley, from John Black.

Striped and clouded grey oblong slate gorget, with two holes. Size 3 15-16 inches by 1 7-16, by ¼ thick. From Ward's Farm, Bexley P.O., donated by Mrs. R. Campbell, Kirkfield P.O.

Oval flint implement, dark grey in color. Size, 4 by 2⅜ by ⅜ inches thick in centre, well shaped, with good edges, and pointed ends. Ovate flint scraper, same material and found with the other. Size 2 by 1 1-3 by 5-16 inches. Well made and has obtuse edges at ends. These implements are extremely rare in this locality. From Neil Sinclair's farm. S. Bay, Balsam Lake. Fenelon Tp., given by J. W. Laidlaw.

Two flint arrow heads, six scrapers, one tooth of unknown animal, worn smooth on top surface, as if used as a rubber, one perfect bone needle, eyed, 2½ inches long, site 8, head of Portage Road, block E, Bexley. Given by J. W. Laidlaw.

From village site 23, lot 12, con. 1, Fenelon, twp. 1. Circular hand hammer stone, pitted, with flattened sides, and perimeter, showing usage, size 3½ by 4, by 1⅜ inches. 1 irregular shaped hand hammer, stone, one side flattened with preparatory pit, a portion of the perimeter shows abrasion.

One smoothing stone, 4½ by 3½, by 2 inches. The top is smoothed and rounded, bottom flat, smoothed and partially polished. Shows traces of wear. The whole surface of stone has been artificially smoothed. These stones are also called polishers, or rubbing stones. Blade part of broken celt degraded to hammer. Large square axe, smoothed surfaces, length 7 inches; width of cutting edge 2½ inches, and thickness 1¼. This variety is very rare here. Blade end of broken celt shows traces of usage on edge, and broken surface. One rough chisel, 5 inches long, 1¼ wide, and a portion of another of same sort. One grooved maul, ovoid, limestone pebble, 3½ inches long, 2 inches wide, and 1⅝ thick, encircled around the middle by a slight pecked groove, which is deepest at the top. A small fragment is broken out. Has a smoothed surface, and is exact counterpart of the stone heads to the Northwest Indian "coup sticks." Two small ovoid pebbles, and one flat oval smoothing stone. Seventeen stone discs, from 13-16 to 2 inches in diameter, and ¼ to 13-16 thick, in all stages of manufacture; none perforated, but several have perforations started.

Two circular and smoothed pebbles. Smaller 1 inch in diameter and 5-16 thick. Largest 1 13-16 by 7-16 inches. These two have been artificially shaped. Two small irregular pebbles, limestone, with natural perforations. Though not particularly striking, they may have been children's toys, or pendants. All these discs, etc., are of limestone, with one exception, which is granite.

Forty pottery discs, in all stages of manufacture. One is perforated, several with perforations started.

One moulded clay bead, with moulded hole, size of bead 1 by 9-16 inch. A group of six finger-nail imprints is on one side of perimeter. The specimen is a rude example of pottery art.

Seven fragments of clay pipes, and seven fragments of stems. One of the pipe fragments is a human mask.

Thirteen pottery fragments, one evidently a portion of a toy pot, one with a hole for repairing-thongs, three possessing curious

rim structure, one with pattern of rows of finger-nail imprints, the rows running in various directions around the rim, and up and down the bowl.

Five bones, showing ends cut off.

One bone skindresser, corner of edge fractured, 7 inches long, made of deer's leg-bone.

Five bone awls.

One bone and one horn socketed implements, perhaps used as arrowheads.

Two bone bangles, three large bear tusks, one beaver tooth, and two deer horn tines, one of the latter has a portion of side removed by grinding.

Two bone beads, in process of manufacture. Two portions of bone heads, one-half of eyed bone needle, one bone point. One piece of worked soap-stone. One flint arrowhead on side of which polishing or grinding has evidently been attempted. One piece of steatite (or marble?) pipe, which has been attempted to further cut into some other form, for ornamental purpose. Perhaps this is usually called secondary cutting. Two natural shaped stones, with artificial ends. The mealing stones (metates), gneiss slabs. Donor of above articles, A. Ferguson, Glenarm.

From site No. 24, lot 23, con. 1. Seven pot discs, various sizes. One clay pipe, flat sides on bowl, and stem having inscribed lines for ornamentation. One broken pipe bowl, showing an unusual flat, shallow, cup shape. One perforated clam shell. One bear's tusk. Ten bone awls. One bone bangle. One bone bead, and several fragments. One fragment of beaver's tooth from lower jaw, showing an artificially formed cutting chisel edge. Carbonized corn, and a clay nodule. Donor of this lot, A. Ferguson, Glenarm.

One iron implement, perhaps a bark-peeler, and several small pieces of sheet brass, from lot 11, con. 8, Eldon. Given by A. Ferguson.

From site 3, lot 5, con. 5, Bexley. One bone awl, 6 inches in length. Three perforated soap-stone beads or discs. One clay pipe, human mask, facing stem or smoker; a secondary stem hole has been bored in front of pipe, then the mask faced away from smoker. This secondary hole is not unusual here; several pipes have been recovered that have been treated in a like manner. Finder of these articles, Wellington Irwin. Procured by writer.

One large greenish blue granite boulder mortar, from lake shore on site 27, Birch Point, Balsam Lake, lot B.F. 26, con. 3, Fenelon Twp. Found by writer. (This specimen is broken in half.)

From site 23, lot 12, con. 1, Fenelon. Three clay pipe bowls, ordinary type. One plain stem. One fragment of stem, with snake coiled around it. Perforated shell (Helix?). One large perforated clam shell, showing use as scraper. One columella 1⅜ inches long of tropical shell. One small sea shell (bivalve). One good bear tooth knife. One beaver tooth (lower jaw), evidently ground to a very

sharp chisel edge. One bone bangle. Two bone beads. Six bone awls. One perforated metatarsal bone. Two fragments of eyed bone needles. One long slender bone needle, 2 13-16 inches in length, with shallow side notches at butt end for attachment of thread. Two slender bone points, with butts shaped to fit sockets. Found by writer.

Bird Pipes.

The first that we will consider is the owl pipe, which comes from a village site on lot 18, con. 15, Tiny Twp., which furnished relics described on p. 48, rep.'99, where it was found in the autumn of 1900. This is a splendid specimen of pipe sculpture, material being dark greenish, gray striped slate (Huronian). The execution and finish are equal to the eagle pipe, p. 37, rep. '90, fig. 86, and material nearly the same. The pipe being carved in such a manner that the colorings are in longitudinal stripes down the side, with

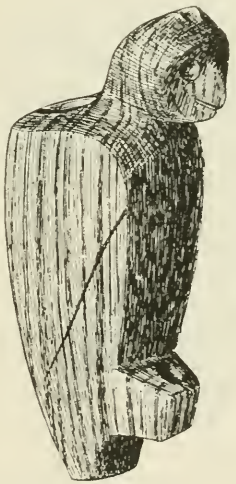


Fig. 34. (23,050).

the curvilinear shadings in front and at the back, giving a very pleasing effect. The transverse section is square, with rounded corners. Greatest width from side to side across the breast 1⅜ inches, and greatest depth from back to front, 1 5-16 inches. Total length of head and body, 4⅛ inches. The body gradually tapers to a short tail. The sides are plain, with the exception of a diagonal cut from the top of the breast on the right side to the lower part of the back, probably conventionalizing a wing. The treatment of the head is much better than that of the owl pipe, mentioned in rep. 1899, p. 49, and from the well defined tufts on ears on this specimen there can be no doubt that it represents the horned owl. The beak is clearly cut, and prominent, mouth well defined, eyes being represented by circular hollows, with the exception of a few lines on the front of the frontal projection, probably representing

claws. There are no other diagnostic features marked. The bowl is a conical shaped hole, coming out at the shoulders, with a diameter of 9-16 inch, and a depth of 1 9-16 inches. The stem hole has a diameter of 5-16 inches, with a slightly upwards incline, and is, as is usual with these pipes, located in the back, and is conical in shape. The drilling in both the bowl and stem-hole has been well done. Several drill rings appearing in the lower part of the bowl show that different sized drills have been used. The whole surface with the exception of the diagonal cut, is smoothed, but not polished, and without marks.

The frontal projection in this specimen is rather more massive than is usual, and the perforation, instead of passing from side to side, as is usual, is reversed, and goes from top to bottom; this perforation has been bored from both ends with a drill of the same size as the stem hole, the narrower diameter of the centre of the hole shows the use of a conical drill. There is a cut on top of frontal projection from the hole to outside edge, then straight down the centre of front, till it meets with a cutting from the hole to the outside edge at the bottom, dividing the face of projection into two parts; on the right part are two parallel lines from top to bottom, on the left is an X; these may be taken to represent claws. As relics showing contact of white men have been found on same site, may have a tendency to show that this specimen is a later production of aboriginal skill. Donor, Herbert G. Glaspell, through favor of E. W. Glaspell, Rosedale P.O., Ont.

The raven pipe is of dark slate, or shale, was plowed up by Mr. Charles Rennie, Seagrave P. O., Ont., 30 years ago, on his farm, lot 18, concession 13, Reach Twp., Ontario Co. It is of excellent design and workmanship * or the technical detail of the head being well executed, while nothing represents the wings, the feet being only deep scratches on the sides of the somewhat protuberant frontal projection. Tail feathers not marked. The remarkable feature about this pipe is the number of deep cavities or indentations on shoulders and neck. (See the same on monkey pipe, fig. 28, p. 29, report of 1887, and panther and

* One who has examined many stone pipes, expressed his opinion of this specimen thus :—The material is obscurely veined Huronian slate, and while the general design is a somewhat bold one from an aboriginal point of view, there are numerous evidences that the working out of the details has been performed by at least two workmen. Indeed, the pipe is still unfinished in some respects.

One of the somewhat interesting facts brought out by a close examination of this pipe is that in the making of the oblong hollows, or slots on the shoulders, the end of each has been produced in the first instance with a drill, and it is probable that intermediate drillings were also made, so that it was comparatively easy to remove the dividing portions. Indeed, on the right side, where one workman has begun to make slots, the evidence of intermediate borings remains.

In this pipe two stem holes have been bored, the lower one in all probability by the first workman. At any rate, it must have been made before the hole to form the bowl, and so low that the sharp-pointed drill used in the latter case failed to tap it. For some reason it would seem to have been impossible to prolong the bowl boring, and hence a second stem-hole had to be bored higher, and apparently with the same tool that was used to widen the original small hole in the bowl, for the diameters of the two now correspond. This is made clear from the fact that the termination of the bowl boring appears on the under side of the second or upper stem-hole. D. B.

bear pipes, figs. 84, 85, report 1890; also woodpecker and partridge pipes, figs. 103, 117, N.Y. State Museum Bulletin on polished stone articles—there being no less than four on right shoulder and three on left, with two extra shallow ones; on the neck are three, one on each side and one on top; one shallow one is placed between the eyes, and one shallow one on each side of head behind the eyes: total, ten deep and five shallow. The deep cavities have evidently been made by boring holes at a small distance apart, and then grinding out the space between them. The shallow depressions are mere grooves. These pits may have been intended for the reception of some foreign substance, after the manner of inlaying, which could have been imbedded in the eyeholes, and colored to suit: gum of some sort would be a favorable material; and then again, hard substances could be used after the manner of the inlaid metal on the Ojibwa stone pipe of Lake Superior, and the inland shell and ivory

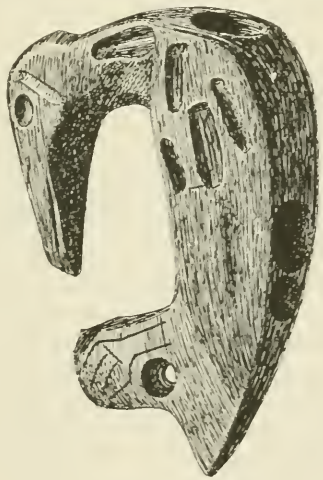


Fig. 35. (23,049).

of the British Columbia stone ware. The beak is very powerful, and has the appearance of being longer, as the lines denoting mouth do not come down to the present point. The nostrils are well defined by oblique cuts, and the eyes are represented by circular depressions. Dimensions, length 3¾ inches, greatest width of body 13-16 inch, depth of body 1¼ inch, length of head 2 inches. The posture is such that it resembles the raven bending its head over to eat something held in its claws, which is further accentuated by the prominence of frontal projection; and it has been suggested that this projection was a fish held in the claws, the idea being helped by the outside outline. There is a slight protuberance on top corner of this projection, having the appearance of something that has been broken off. This is in direct proximity to the end of the beak. Distance between back and forehead 2⅝ inches. Below the outlines of the feet is a transverse perforation, bored by a coni-

cal drill. Bowl and stem holes are in usual position, and have been bored by a conical drill. Bowl 1¾ by ⅝ inches in size. Stem hole 11-16 in diameter, and is of a more obtuse shape than bowl. Immediately below a second hole has been attempted, for what purpose it is not definite, unless a miscalculation was made on depth of bowl, and then the attempt abandoned. Depth ½ inch, and diameter 7-16 inch, conical shape. Transverse section of body squarish, with rounded corners, an attempt has been made to delineate the wings by longitudinal depressions down the breast, one on each side. From the top of shoulders, at the juncture of the neck, two cuts begin and pass down on each side of back to end of wings. This is a remarkably fine pipe, and is in quite a natural position, and shows an enlargement of the aboriginal art idea.

Several years ago a skeleton was dug up on Foster's farm, and some flints found on the hill. This is due south of site No. 23, on next lot, but a close examination revealed nothing of it.

New Site.

On west side of Indian Point, Balsam Lake, which juts down from the north, and at a distance of about ¾ mile from the end, the writer found traces of aboriginal occupation, which at a later investigation disclosed the fact that this was another site. Twelve or thirteen ash beds were found, of which six or seven were on the immediate shore, which here is a bank very abrupt and rocky, about eight or ten feet above water, the actual shore being flat limestone rock. The flat on which the village site is, is of sandy loam. The "dump heaps" on edge of bank had an external covering of sand, which was blown up from the shore, to the depth of several inches. A heavy growth of pine has grown over the place since the site was occupied, of which some stumps are about four feet in diameter. Several heaps were dug into, and the material removed was put through a sieve, with the usual results of fragments of pottery and pipes, carbonized corn, charcoal, bones, shells, fish scales, bone bead, and needle. Burnt stones and fire fractured stones are plentiful on surface of ground. Flint chips and fragments were very frequent. The extent along the shore of the site was about 100 yards. The site is partially cleared and partially covered with underbrush, but has never been plowed, and is adjacent to primeval woods. Mr. J. H. Carnegie is owner of property. This makes No. 32 village, site N. Victoria.

List and locality of village sites, graveyards, large pits, and cache pits, to date, corrected :—

No. 1. Rummerfield Hill, lot 1, North, Portage Road, Bexley Twp., N. Victoria, with graveyard located.

2. Logan's Hill, lot 22, concession 3, Eldon Twp., N. Victoria.

3. Corbett's Hill, lot 5, con. 5, Bexley Twp., N. Victoria; graveyard not located.

4. Heaslip's Point, Balsam Lake, lot 2, North West Bay, Bexley Twp., N. Victoria.

5. McKague's, lot 9, con. 3, Bexley Twp., N. Victoria; cache pits not located.

6. Smith's, lot 18, Gull River Range, Bexley Twp., N. Victoria; cache pits located; graveyard not located.

7. Benson's, lots west ½ 5 and 6, con. 2, Bexley Twp., N. Victoria; cache pits located.

8. Head of Portage Road, Balsam Lake, block E, Bexley, N. Victoria.

9. Truman's, lot 22, con. 8, Eldon Twp., N. Victoria.

10. McDonald's, lots 44 and 45, South, Portage Road, Eldon Twp., N. Victoria.

11. Perrington's, Long Point, east ½ of lot 29, con. 1, Fenelon Twp., N. Victoria.

12. Carnegie's, Indian Point, Balsam Lake, Bexley Twp., N. Victoria; graveyard not located; modern Indian graves and remains of houses (chimneys) located.—No. 1.

13. Newby's, lot 2, con. 11, Mara Twp., N. Ontario.

14. Rumney's, lots 56 and 57, Front Range, Somerville Twp., N. Victoria.

15. Wallace's, lot 60, Front Range, Somerville Twp., N. Victoria.

16. Moore's Hill, lots 19 and 20, Gull River Range, Bexley Twp., N. Victoria; large pits located.

17. Ead's, lot 24, con. 2, Somerville Twp., N. Victoria.

18. Reid's (Head River), lot 25, con. 3., Digby Twp., N. Victoria.

19. Campbell's (Deer Lake), lot east ½ of 1, con. 8, Laxton Twp., N. Victoria.

20. Barrack's, block E, lake shore, Bexley Twp., N. Victoria; modern graves located on shore near by.

21. Fraser's, lot 21, con. 9, Eldon Twp., N. Victoria.

22. Chrysler's, lot 17, con. 3, Carden Twp., N. Victoria; large pits located.

23. Clarke's, lot 12, con. 1, Fenelon Twp., N. Victoria; graveyard not located.

24. Brown's, lot 23, con. 1, Fenelon Twp., N. Victoria; graveyard not located.

25. McKenzie's, lot E part 22, con. 1, Fenelon Twp., N. Victoria.

26. Jamieson's lot W. ½ 23, con. 2, Fenelon Twp., N. Victoria; embankment and two graveyards located.

27. Birch Point, South Bay, Balsam Lake, lot BF 26, con. 3, Fenelon Twp., N. Victoria.

28. McArthur's, lot west part 26, con. 4, Fenelon Twp., N. Victoria.

29. Lee's, lots 69-71, Front Range, Somerville, N. Victoria.

30. Winterbourn, lots 11-12, con. 8, Laxton Twp., N. Victoria.

31. Hilton's, lot 12, con. 7, Laxton Twp., N. Victoria.

32. Carnegie's, No. 2, Indian Point, on west side. Balsam Lake, Bexley Twp., N. Victoria.

Modern or recent Indian graves located on Heron Island, Lower Mud Lake, Carden Twp., on Carnegie's Point, and on shore at block E, Bexley, Balsam Lake; also mound graves on Ghost Island, Balsam Lake.

Up to late years Indian Point was an Indian reserve. The remains of the houses used there can be plainly seen.

Corrections in report, 1900 :—

Stone pipe, fig. 23, p. 21. Comes from Tiny Twp., Simcoe Co.
Stone pipe, fig. 24, p. 21. Comes from Fenelon Twp.
Bone fish hook, fig. 29, p. 23. Comes from Fenelon Twp.

Second legend of embankment on site 26, lot w. ½ 23, con. 2, Fenelon :—

Donald McKenzie of Cambray P.O. was informed over 40 years ago by one, John McDonald (from Badenoch, Scotland), that he first saw the embankment 67 years before that, and that the curves and edges were sharp and distinct. An Indian had told him (John McDonald) that this embankment was built by the French, who came in by the way of Beaverton (to the west), and were attacked and defeated by the Indians. The slain of both parties were buried on the spot, in two different places. The French nearest to the embankment; certainly the two graveyards seem to bear this story out.

NOTES ON CANADIAN POTTERY.

By F. W. Waugh.

The art of making pottery has long since disappeared among the Indians once claiming Ontario as their hunting grounds. This was a natural consequence of the introduction of copper kettles and other vessels of European make, which were stronger and lighter than the Indian ware.

Historical references to the manufacture of native pottery are few and unsatisfactory, so that we are obliged to piece out our information from this source by the study of a small number of entire pots, and the numerous fragments found on the sites of ancient villages.

Many of these fragments exhibit a laminated edge, and a tendency to scale away in layers, which gives an indication of the manner in which the vessels were constructed. This was no doubt accomplished by joining and moulding slabs of clay of the proper thickness, adding more where necessary, and by smoothing and shaping the whole with some simple tool, such as a wooden paddle

or a clam shell, used with water. (Figs. and). Round-bottomed pots were the invariable rule among the Indians of this region, who were mainly of Huron-Iroquois or Algonkin origin; why were the bottoms made of this shape? No doubt vessels with such bottoms

Fig. 36. (No. 3,146).

were stronger than flat-bottomed ones, and so less liable to breakage, and could also be made to stand more readily in hollows in the ground, which usually answered for both table and fireplace. Some of our most eminent archaeologists express the belief that a rounded hollow was made in the sandy soil, of the same size and

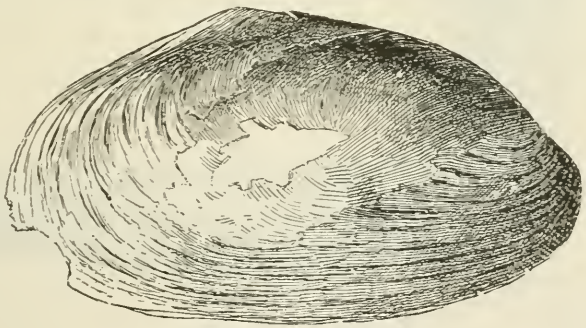


Fig. 37. (No. 8,609).

shape as the lower portion of the intended vessel. In the hollow thus formed, the bottom would be quickly and easily built up, and support would be afforded the whole vessel in the plastic state. Drying could then take place without the removal of the pot. Some specimens in the provincial museum present the appearance of

having been patted all over the outside while still plastic, or partly so; this occurs especially on the lower parts of vessels, and appears to have been done with some object having a small surface, in some instances; other specimens bear the appearance of having been similarly treated with a paddle wrapped with cord, or some sort of woven fabric. This was probably intended to weld and solidify the

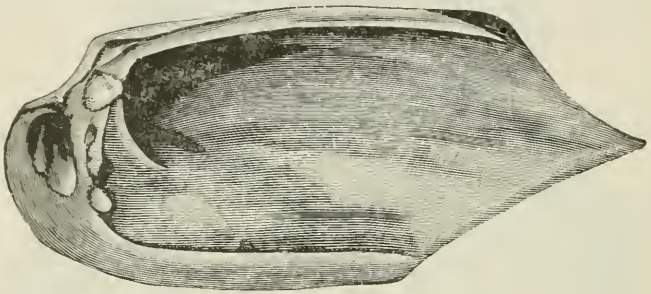


Fig. 38. (No. 8,608).

bottom, which had previously been manipulated mainly from the inside.

The material used was common clay, which was nearly always obtainable from the bank of some stream. This material was crushed, and made into a dough, with water. To this was added a quantity of granite, burnt and pulverized, which no doubt gave a hard surface, but would need to be added in moderation, as it would increase

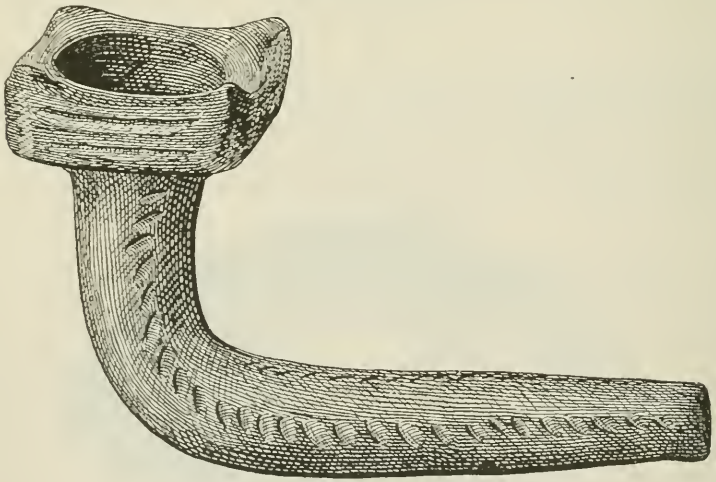


Fig. 39. (No. 6,898).

the friability of the vessels. In fact, it is owing to the presence of these granite particles that pots found in the damp earth are usually broken, and readily crumble to pieces. Judging from the number of fragments found in camp refuse, pottery must have been rather short-lived at best. It was possible, however, to mend vessels not too badly broken, and render them still serviceable for culinary purposes. This was done by the simple method of drilling

holes on each side of the crack and binding the parts with cord. This practice fully accounts for the drilled holes sometimes found in fragments of pottery.

In Ontario generally, the standard type or form for pots was that of a wide-mouthed jar or vase, with a round bottom. Some pots have been found possessing a single ear or lug.

Pots were, no doubt, used principally to contain water, and as cooking utensils. The latter use is plainly evidenced by the incrustation of burnt food still to be found adhering to the inner sides of

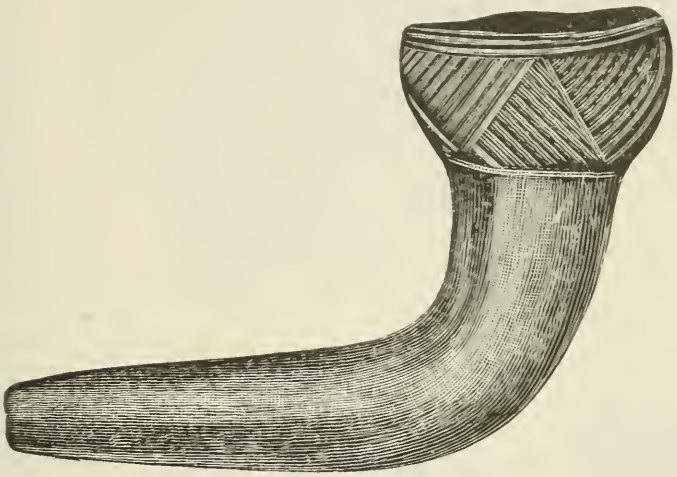


Fig. 40.(No. 6,822).

vessels, and even of fragments. Pots are sometimes found in graves, where they were placed to hold food for the departed spirit, but there is no reason to suppose that any were made especially for this purpose, in our part of the country at least. *

In speaking of pottery, we must not forget to mention the clay pipe, the making of which is usually credited to the men. Pipes of this kind were of various shapes, but one or two forms seem to have met with especial favor. (Figs. 7, 39 and 40). The making of the hole through the stem would seem to have been the most difficult operation. This was accomplished by forming the stem around a thong, or a flexible twig, which would be destroyed in the process of burning.

* "The reader will observe that considerable care has been taken in referring to, or in describing, vessels of shell or of earthenware, to note whether or not they were imperforate as to the base. This, it may be well to explain to some, has been done in reference to a custom obtaining to a considerable extent in Florida where vessels placed with the dead often had the bottom knocked out, the base perforated, or a hole made in the base at the time of manufacture, presumably 'to kill' the vessel to free its soul to accompany that of the dead person. This curious custom has been regarded as peculiar to Florida, but it is interesting to note a possible observance of it to a limited extent in the mounds of the Georgia coast. It is well to note, however, that in cinerary urns, perforation of base is never met with."

CLARENCE B. MOORE, in "Certain Aboriginal Mounds of the Georgia Coast." P. 9————Philadelphia, 1897.

Considerable variety, within certain limits, is shown in the surface decoration, which seems to have been much in vogue then. This took the form of a border around the rim, and also around the shoulder or portion just below the neck. Very seldom was any attempt made at decorating the whole exterior. Fig. 41.) Here we have a view of an interesting stage in the infancy of an art.

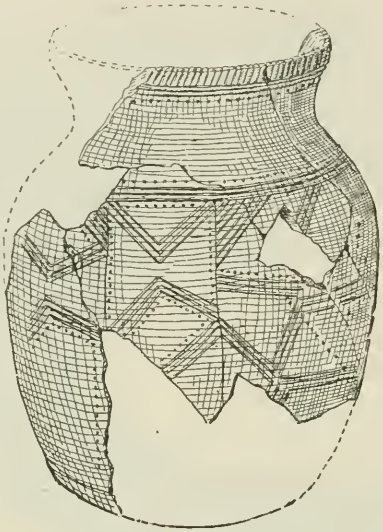


Fig. 41. (No. 8,371).

We are also near enough to its source to ask whence it came. What prompted these primitive savages to repeat a simple pattern, thereby forming a border ? The question is easier asked than answered. There seems to be little to warrant the supposition that the ordinary designs had any more significance than similar designs possess at the present time. They were no doubt the outcome of that artistic

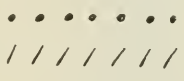


Fig. 42.

Fig. 43.

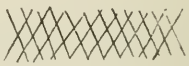


Fig. 44.

Fig. 45.

Fig. 46.

Fig. 47.

phase of human nature which finds satisfaction in the same mode of expression to-day. It seems probable, moreover, that they were hit upon in the first place quite by accident. Some vessel, before drying, may have received certain marks, accidentally or otherwise; these may have been repeated simply in imitation, or to disguise the marks of the accident; the result would be found pleasing to the

eye, hence the evolution of the border. The simplest border conceivable would be a series of dots or dashes. (Fig. 42.) Designs as

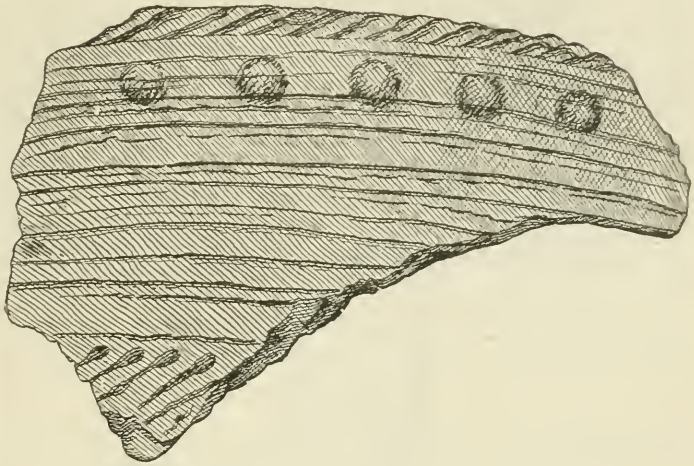


Fig. 48. (8,430)

Fig. 49.
No. (10,505)

Fig. 50. (17.018)

Fig. 51. (7,909)

simple as this are found on many pots. An advance upon this would be a series of parallel vertical or oblique lines (Fig. 43), a pattern

also often found. Oblique lines could be made in two directions, and used in single or double rows (Fig. 44). The latter combination would very easily lead to the angular or arrow-shaped design (Fig. 44). Other patterns were obtained by two sets of oblique lines, as in Fig. 45. The latter design is found with perhaps more frequency than any other among the more complicated designs, and seems to be what we might call a representative or typical pattern. It is to be noted that the only artistic elements used were straight lines; no curves are to be found, except that lines are frequently made to run parallel with scalloped rims. No animal or plant forms were used. Pipes were certainly made to represent men and other animals, but this would come in for consideration under a different artistic treating from pure design. It is also true that small

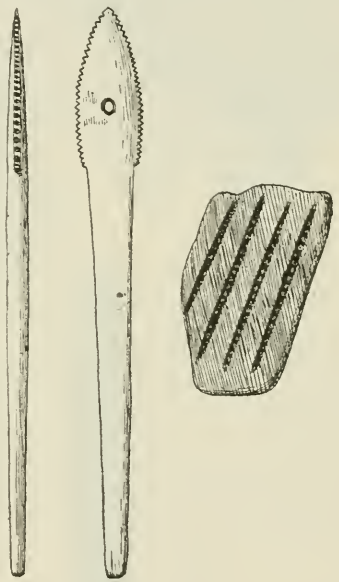


Fig. 52. (20,026)

circles were sometimes used, but these were stamped with hollow stems, or bones, not drawn freehand. It is impossible to describe all the patterns found on pottery; suffice it to say that the possibilities of the straight line seem to have been almost exhausted in the great variety of patterns to be found.

The designs mentioned were usually traced in the clay by some pointed instrument. The only raised work attempted was the making of small bosses or eminences by punching holes in the clay from the inside of the pot (Fig. 48). The line itself admitted of some variety; accordingly we find impressions of twisted strings, or of slender sticks closely wound with cord, and markings which might be made by the light impression of some coarse fabric. Other markings, sometimes attributed to the use of a notched wheel or roulette, were probably made by an instrument similar to Fig. 51, as

there is no ground for believing that our Indians had advanced so far in mechanics as to make use of a wheel revolving on an axle. It is difficult to say with what some impressions were made. Comb-like tools of bone were probably used as markers. Many pointed pieces of bone are found around village sites which are much too blunt to have been used as awls, and were probably employed as markers also. The difference between a pointed bone that may have been used as an awl and one that could not be made to serve such a purpose is shown in figs. 50-51. Almost anything would serve as a marker in an emergency, even to a sharp thumb-nail, with which the patterns on a few pieces in the museum were executed. Fig. 49 suggests its use as a tool for patting the outer surface, or possibly for tracing parallel lines. There is no doubt that tools for making and embellishing pottery, varied somewhat according to the fancy of the maker. This would naturally be the case in the crude condition of mechanical arts generally, and of pottery-making in particular.

ON THE PAGANISM OF THE CIVILIZED IROQUOIS OF ONTARIO.*

By David Boyle.

It has often been a subject for doubt whether this or that primitive people, if left to itself, would have emerged into civilization—in other words, it has proved a matter of uncertainty whether the people concerned, possessed the potency of progress. In some cases Dame Nature has relentlessly cut off the supply of raw material before the experiment was well begun, and in others but a short time afterwards, showing us, at any rate, that the elements of success were nullified, and worse than nullified, by contact with superior peoples.

Respecting no division of the human race has there been more diversity of opinion as to innate possibilities of improvement than with regard to our American Indians. But the terms just mentioned are of very wide application—much too wide to make it possible for anyone to arrive at a conclusion; for what is true of one stock, or of one group in a stock, may be wholly, or largely, inapplicable to any other division or subdivision.

The Huron-Iroquois believe that they themselves originated from a hole under a hill on the north shore of the St. Lawrence river. Their traditions further declare that on account of a great dissension which took place, those who were latterly known more specifically as Hurons, and have been regarded by Brinton and Hale on philological grounds as the senior branch, found their way by circuitous routes to the country which lies north of Toronto, on

*Read before the British Association in Bradford, Sept. 5th, 1900, and reprinted from The Journal of the Authropological Institute, Vol. XXX., July-Dec., 1900.

The present paper is an attempted analysis of Iroquois pagan belief, based on the details given in the Ontario Archaeological Report in 1898.

the south shore of the Georgian Bay ; while the portion we call Iroquois took a southerly course and occupied the northern and central part of what is now the State of New York.

Other two not inconsiderable bodies found excellent hunting-grounds still farther west, on the northern and southern shores of Lake Erie, the former being known to us as the Attiwandarons, or Neutrals, and the latter as the Eries, or Cats. Other divisions lying south of the main body were the Tuscaroras and Andastes. It is wholly with those who made their home in New York and ultimately in Ontario, that we are now concerned.

It is unnecessary for present purposes to follow the history of these people from the date of their first contact with the French. Let it suffice to say that early in the seventeenth century they became the undying enemies of France, on account of an attack that was made on them by Champlain, who allied himself with the Hurons of Ontario, and thus initiated a series of wars that continued until the French were compelled to retire from the continent. This almost chronic state of hostilities, however, did not prevent French missionaries from devoting themselves to the conversion of these most untamable of savages, a small portion of whom became Roman Catholics, and have left descendants living now at St. Regis and Caughnawaga on the St. Lawrence. Protestant missionaries also, both Dutch and English, met with some success ; but still a very large minority remained true to paganism, so that of those who, on account of their loyalty to us, left the newly formed United States to take up their abode in Canada, nearly one-fourth clung to the belief of their forefathers. To-day the proportion of avowed pagans to professing Christians is about the same, and we have, therefore, on the Grand River Reserve in Ontario a pagan population of fully one thousand persons. There is another settlement on the Bay of Quinte at Deseronto, all the members of which are Mohawks, and profess Christianity.

It will be seen very readily that a condition of society in which paganism openly professed and practised has existed side by side with Christianity for nearly three hundred years cannot fail to possess many features of peculiar interest to the ethnological student, and to afford much material for profound study.

One of the first things that obtrudes itself on the attention of a visitor, even during a brief stay among the Iroquois, is the utter indifference of Christian or of pagan to the religious convictions of each other. In their Council or governing body of fifty-two members both beliefs are represented; yet no recriminations, or causes of difference occur on this account. Many of the so-called Christians are influenced largely by old-time predilections, and either attend no place of worship at all, or would just as soon put in an appearance at a pagan festival in the long-house. Still it must be acknowledged that there are whole families on the Reserve which are as truly Christian as birth, bringing-up, and Indian nature ren-

der possible; but one's opinion of the possibilities need not be unreasonably high.

The pagan does not regard himself, nor is he regarded by others, as being in any degree, or in any sense, inferior. He is not ostentatiously a pagan otherwise than in connection with the regulation feasts, such as those of the New Year (when the white dog is burned), the strawberry-dance, the corn-dance, and many others. Indeed, it is not characteristic of the Indian to be ostentatious in any capacity, except that of a brave, and, for the Iroquois, the days of bravery in his sense have long since departed. In his religious or ceremonial dances he may deck himself gorgeously with bead-work, cheap jewellery, feathers, and highly colored garments, but there is an evident lack of individuality about him notwithstanding. He seems to regard himself merely as an anybody; as a quite indifferent unit of his clan; as one who happens to have the necessary garments for such a display, and whose impersonal or clan duty it is to appear in any sort of grotesque costume he pleases. Other men please themselves also by attending the most solemn feasts in everyday clothing. Most of the younger fellows appear in fashionable tailor-made garb, with linen collars and bright silk neckties. The women dress, as a rule, more carefully and conservatively than the men, their chief article of apparel besides their gowns or dresses being a brightly colored shawl, either of some strong uniform color or of a large tartan pattern.

Now as to the worship itself. Originally it was, as a matter of course, purely of a natural kind; that is to say, it was founded wholly on the experience of the race respecting everyday phenomena, the occurrence of which was accounted for by explanatory tales based on anthropomorphic and zoomorphic grounds. Thus the sun would appear to have been regarded as an animate being, with whom, in time, became associated the Great White Wolf, if, indeed, it was not itself this very animal. Whiteness, it may be observed, was always associated in the Indian mind with the East, and, in time, with goodness, success, and health. The other cardinal points were also connected with their respective colors. In some mythologies the deer became the mediator of the sun, and in others the turtle. Among nearly all American peoples the rattlesnake was of supreme importance, yet we do not find this creature represented among the totems of the Iroquois. Animism, or spiritism, pervaded every nook and cranny of Indian belief. Not only could the lower animals converse with one another, and arrange plans to benefit their human friends, or plots for the discomfiture of their enemies, but the hills, the rocks, the streams, the trees, and every object in nature, as well as those produced by art, possessed a spirit.

They also had their equivalent of the "fairies" of the Old World—little people who held the power to assist men, or to play them infinite mischief.

Certain places were, to use a Scottish phrase, "no' canny." Among the Iroquois such places were mostly near rapids, or were

the rapids, but sometimes they were in the form of caverns, or of beetling cliffs, on the shores of rock-bound lakes. On approaching or in passing such spots placatory offerings of tobacco were made, and sometimes objects of considerable value were dropped into the water.

To dreams, our Iroquois, with all his congeners, was an abject slave, for he regarded them as the experiences of the first of his three souls, the second being the one which always remained with his body, and the third that which became visible as a shadow.

Roughly, this was the mental attitude of the Iroquois to nature and natural phenomena until the appearance of Ayontwatha, the "Hiawatha" of Longfellow, who, however, makes an ethnological muddle by assigning an Iroquois culture-hero to Algonkin legend. Ayontwatha was, first of all, a political reformer, if we may so dignify one who lived in such a crude condition of society; but his success in bringing about a confederation of the Caniengas, Senecas, Cayugas, Onondagas, and Oneidas must have exercised a very powerful influence in modifying some beliefs and intensifying others among all these "nations" or tribes.

We know not when he lived, despite attempts that have been made both by Indians and by whites to determine his date. But, in any event, there came a time when the spirit of change entered the minds of the Iroquois, and henceforth they became more adaptive and more modifiable than their surrounding Algonkin neighbors. Thus it was, in large measure, that they proved themselves such unconquerable and resourceful opponents of European, and especially of French, aggression.

After falling under purely British influence the number of professing Christians rapidly increased, but, as has already been pointed out, fully twenty-five per cent. have remained steadfastly pagan.

It is from this point that our study of Iroquois paganism becomes interesting, because it was impossible that Christian and pagan doctrines and practices could long exist in proximity without some modifying influences extending from the stronger to the weaker side. Long before this time, however, the Iroquois, in common with many other native races, had, perhaps unconsciously, adopted the idea of a Great Spirit from the missionaries, for in the aboriginal pantheon no one being of this kind exercised supreme power, or even seemed to take any interest in the work of the other spirits, an idea based no doubt on the customs of the Indians themselves, over whom no one man exercised absolute sway.

Having adopted the idea of a Great Spirit, the admission of some other beliefs became easier, not because they had any logical connection at all, for logic is quite foreign to the primitive mind, but because, perhaps of the familiarity consequent on intercourse with Christians, both white and of their own kind.

It was probably on account of knowledge arrived at in some such way that an Onondaga, by name Ska-ne-o-dy-o, who lived at the end of the eighteenth century (in 1790, according to some), de-

clared himself a prophet and claimed to have had intercourse with divine beings. His congeners, by this time, knew enough about Christianity to be in some measure prepared for a message from the Great Spirit, and their peculiar notions concerning soul-experiences fitted in with the announcement of Ska-ne-o-dy-o that he had been favored with an interview by four beings in heaven. Undoubtedly the Indians had heard of the Trinity, but as three is an unsatisfactory number to the Indian mind, we here have a reference to four persons, or the Four Angels, for although Ska-ne-o-dy-o saw only three, the fourth one was always present.

It is somewhat remarkable that although this revelation is of such a comparatively recent date, there is a good deal of confusion respecting what is known of the circumstances by the friends and relations of the prophet; but this only goes to show us how extremely difficult it is to get at the truth in such matters, and how little confidence we may place in tradition, if we demand exactitude.

All the stories, however, agree in the statement that Ska-ne-o-dy-o's revelation came to him while he was in a trance, so that we need not care whether this condition lasted for only a few hours or until he came to himself on the fourth day. He did not profess that he had seen the Great Spirit, but only the four beings who were commissioned by the Great Spirit to deliver His message. These were young men, dressed in the height of Indian fashion, and carrying bows and arrows. Here we have a compromise and a correspondence, the former as to the number, and the latter as to the office; for Christian teaching always introduces a medium of communication between the Creator and His people. As a matter of course, the four persons were Indians, and behaved in Indian manner, for otherwise the appeal to Indian minds would have lost much of its effect. Still, Ska-ne-o-dy-o perceived clearly enough that his people required a new gospel—one that would correspond in a measure to the altered circumstances in which they found themselves, and that would, to some extent, place them on a level with white men. Himself, no doubt, unaware that a belief in the Great Spirit was one of comparatively recent acquirement, he urged the people to offer prayers to Niyoh, the Creator, but he adds a touch of Indian anthropomorphism when he teaches that all such addresses must be made before noon, on the ground that, as the Great Spirit goes to sleep in the afternoon, he cannot then hear anything said to Him. These prayers were merely an adjunct to the old-time dances which were to be maintained; for the angels said to Ska-ne-o-dy-o, "You must worship Niyoh, the Great Spirit, by dancing the turtle-dance at the new moon when the strawberry ripens. At the new moon of the green corn you shall give a thanksgiving-dance. In the mid-winter at the new moon you shall give another thanksgiving-dance. You shall have a thanksgiving-dance at the new moon at the time of making sugar. You shall dance at the new moon of planting time, and pray for a good harvest. You shall dance at the new moon of the harvest-time, and give thanks for what the Great Spirit

has given you." Oral prayer was therefore, largely, the result of European influence, something with which the Indian had become to some extent acquainted, and something that was of comparatively easy assimilation.

Even the matter of the prayers, however, is in the nature of a compromise, for the addresses to the Great Spirit are rather in the form of requests that He will command other entities to do their duty, the performance of which, but for His orders, might be done either reluctantly, or not at all. Take, for example (remembering meanwhile, the animism which pervades the Indian mind), the following petitions in the prayer which is used at the Burning of the White Dog in connection with the New Year festival :—

"We ask that the sun will continue to shine on us and make all things grow.

"We ask that the moon may always give us light by night.

"We ask that the clouds may never cease to give us rain and snow.

"We ask that the winds may always blow.

"We ask that the trees and plants may always grow.

"We ask that Thou wouldst send all sorts of animals for food and clothing, and make the birds increase in number."

In this modern form of prayer it will be observed that Rawen Niyoh, the Great Spirit, is addressed as controller and director; in older (but not the oldest) forms of address, which certainly are not prayers, the animistic and individually independent idea comes out strongly, as when, for example, at the green-corn-dance the head man, or speaker, says, "We thank the earth for all the things that grow for food," and at a Cayuga sun-dance, at which I was present, the old Chief opened the ceremonies by thanking the earth for having yielded grass, trees, tobacco and medicine, the sun for giving light and heat, the moon for making dew, and the thunder for supplying rain and for preventing serpents from coming up through the ground and destroying the people. And then comes this: "We thank the Four Angels for protecting us from sickness, disease, and accident, and the Great Spirit for providing everything and governing all things, although we cannot see Him and never will see Him, unless we are good." Here the stock and the grafts are quite distinguishable; the ancient phrases remain much as we may suppose them to have been for centuries, while Rawen Niyoh and the Four Angels are a plain addition without the remotest attempt to modify the old or assimilate the new.

The animistic and the anthropomorphic assert their sway once more when we are gravely informed that Rawen Niyoh also thought it would be a good plan to have some Thunderers, to whom he gave power to take charge of the whole world, telling them to use plenty of cold water in their work, as long as the world and the people should last. "He said to the Thunderers, 'You may go among the people just whenever you like, and give them all the water they need'; and we know that all the plants and trees are pleased when

the cold water comes to the earth. They are glad the Thunderers have not forgotten them. Niyoh also told the Thunderers to kill anything that might be unlucky to the people."

The Indian Angels vouchsafed to Ska-ne-o-dy-o other information, some of which had reference to what we may suppose the best of his people had always believed, but some of it undoubtedly inspired by Christian influence. Thus they told him that Niyoh intended men and women to marry and have families; that the children were to be treated kindly, not to be provoked in any way, not to be despised for ugliness or awkwardness, never to be whipped: that homeless children should be adopted by married persons without families; and that no person in want should be turned away hungry from one's door. In all this, as well as in what appertains to the holding of dances, or festivals, we have what is native, or nearly so: but when Ska-ne-o-dy-o declares that the four persons said, "Your people must not play cards," and "Niyoh says it is wicked to play a fiddle, and wrong to drink rum," he is profiting by his contact with white people. The reasons adduced for the last-named inhibition are truly Indian. "If," said the prophet, "you are drunk when you go hunting, the animals will smell you a long way off and keep out of your way; if you go a-fishing the fish will hide; if you are driving a horse the smell of the rum will make him run away; your dog will not like you; your corn and pumpkins and tobacco will not grow; if you try to dance or to run, or to sit still, you will have no sense; everything will go wrong."

It might be difficult to find a better illustration of purely aboriginal and illogical reasoning than this is. Incapacity to hunt, fish, manage a dog or a horse, or to cultivate plants is attributed to the intelligence of these things; they know that the man has been drinking too much, and for this reason fear him, or despise him; and it is only when the man tries to sit still, or to run, or to dance when drunk, that he himself will discover his lack of sense.

The inhibitions respecting cards and the use of the fiddle were no doubt intended by the "four persons"—i.e., by Ska-ne-o-dy-o—to prevent too much social intercourse with white people, the former on account of the Indians' well-known gambling propensities, and the latter owing to their equally notorious desire for the strong drinks which usually accompanied such festivities a century ago. It was no doubt also intended to prevent any assimilation of the native feasts or dances with the white people's social gatherings—perhaps, indeed, this was the main consideration.

Gambling in general, however, was not forbidden, only gambling with cards. The Indian prophet was too well aware how utterly impossible it would be, even were he wishful, to abolish this practice among his people. Twice a year, at the great public feasts, it is allowable to play for stakes; and at home, or elsewhere, the people can always do as they please in this respect.

The feasts or dances so often referred to were, and are, a stern necessity. Without these, life to the pagan Indian would not be

worth living, and one of them is held on every possible occasion in addition to the regular, seasonable, ceremonial affairs to which reference has already been made. But, in accordance with present custom, some of the latter are set apart for thanksgiving. Now the giving of thanks (in our sense) for anything is wholly foreign to Indian nature, as, indeed, it is perhaps to aboriginal nature everywhere. It is an acquired method of expression, and whether the sentiment of gratitude has yet been acquired is another question.

Agreeably to the totemic idea, thankfulness is out of place, or rather has no existence in any of life's conditions. For primitive man in his tribal relations, individualism has but a hazy meaning, if any at all. He gives as freely as he takes, neither expecting nor giving thanks, but his associations with us have taught him to comply with form at least, and thus in some measure to remove from himself the reproach of the white man respecting Indian "ingratitude." We find, therefore, that Ska-ne-o-dy-o has introduced expressions of thankfulness in connection with some of the ceremonial feasts, but it is also observable in the older and slightly adulterated dance-speeches that not a word of this kind occurs. Take, for example, the address of the head man at the Burning of the White Dog, notwithstanding its ostensible appeal to Niyoh. Following what may be called the invocation, he asks that the sun, moon, clouds, and winds may continue to perform their duties; that the warriors, young men, and women may be preserved in health and strength; that medicine-plants and fruit trees may continue to grow; that game may be abundant for food and clothing; and he concludes with the self-righteous and unconsciously humorous wish, "May the scent of the tobacco I have thrown on the fire reach Thee to let Thee know we are still good, and that Thou mayest give us all that we have asked."

With the introduction or adoption of the belief in a Great Spirit—"One, you know, that bosses all the other spirits, and the little peoples, and Ta-ron-ya-wa-gon, and Ong-we-ho-gon, you know," as a Seneca once explained to me—it became necessary to provide some means of communication between heaven and earth in addition to prayer and thanksgiving, which, alone, are somewhat too intangible for this purpose. The Burning of the White Dog was therefore seized as a fitting occasion for the sending of messages heavenwards. But this long antedates the appearance of Ska-ne-o-dy-o, who actualy forbade the ceremony, probably because it was a subject of ridicule among white people. Notwithstanding both circumstances, our Canadian Iroquois pagans maintain the custom in connection with their annual New Year's dance at the time of the February new moon, when near the close of a ten days' celebration the master of ceremonies reverently says :—

"Great Master, behold here all of our people who hold the old faith, and who intend to abide by it.

"By means of this dog being burned we hope to please Thee, and that just as we have decked it with ribbons and beads, Thou wilt grant favors to us, Thy own people.

"I now place the dog on the fire that its spirit may find its way to Thee who made it, and made everything, and by this means we hope to get all we want from Thee in return."

In full accordance with Indian belief, the spirit of the dog, on reaching Niyoh, will apprise him of the state of affairs on the earth, a belief that not only proves a want of faith in the adequacy of prayer alone, but which could not have had any reason for its existence before Rawen Niyoh himself was introduced to "boss all the other spirits." But the killing, burning, or sacrifice of a white dog has always, and everywhere over the northern part of our continent, possessed some mysterious influence. In our archaeological report for 1898 some pains have been taken to summarize our knowledge of this custom, whereby it appears that not only with the Iroquois, but among the Algonkian, Athabaskan, and Siouan peoples, as well as among the more highly cultured Aztecs, the custom of using such an animal in one or other of these ways was very generally observed.

It may suffice in this connection to state that in the opinion of General Clark, of Auburn, New York,who has made a special study of Iroquoian mythology, the white dog is now employed as a substitute for the white wolf, which formerly represented the sun; and Dr. Brinton, quoting Von Tschudi, approves the statement of the latter that "white dogs were closely related with cosmogonical and culture myths" in many native religions.

However this may be, the point to be observed here is that our present-day pagan Iroquois, having long since forgotten the original significance of the rite, now attribute mediatorial or intercessory powers to the white dog, the spirit of one of which they despatch annually to carry a message to Niyoh, or Rawen Niyoh, the Creator. Nothing can be more certain than this, that when there was no Great Spirit there was no need for the services of a messenger.

But notwithstanding the evident influences which led to this new idea respecting the office of the white dog's annual visit, implying as it does a heaven, as distinguished from a mere "happy hunting-ground," it is worthy of notice that our Indian friends did not take kindly to the idea of a hell, which they have left in the undisturbed possession of the white man. Punishment in any case was objectionable to the Indian. It may be difficult to reconcile this statement with our knowledge of the cruelties he inflicted on his enemies, whether white or of his own blood; but his purpose on such occasions was rather to maintain the honor of his totem, or of his tribe, by rendering, or providing, an equivalent for the sufferings of his own people when they were in the enemies' hands, as well as with a view to test the power of his captives' endurance, hoping, if possible, to make them evince signs of pain, and thus prove themselves to be only women. Our pagan Iroquois, then, has no hell,

but his leniency in this respect is more than counter-balanced by his exclusiveness respecting heaven, where he admits no white man. On the New York Reserve it is asserted that George Washington, on account of his goodness to the Indians, has been permitted to go half-way, where he remains speechless, and accompanied by his dog; but on the Grand River Reserve, in Ontario, I have never heard but one Indian refer to this exception, and it is not improbable that in time it will be wholly forgotten among Canadian pagans.

The remark has often been made that certain groups of people in various parts of the world have failed to keep pace with neighboring groups through sheer inability to advance beyond a given line. Among ourselves civilization is a comparatively slow process, and with some of us it is of much slower development than it is with the mass. American Indians are not a progressive people. They assimilate European notions very slowly, and, at best, somewhat imperfectly. Tradition and usage are more powerful than appeals to action along new lines, even when the advantages of the latter course are made plain. It is only when tradition has been deprived of its power by the segregation of individuals from national or tribal associations that tradition itself ceases to govern.

If we judge the pagan Iroquois thus, we shall wonder that they have been in any way modified by European contact so far as their religion is concerned, for they are thoroughly separated from their Christian fellows in all that concerns their myths and superstitions. It is not with them, as it is with us, a matter of disputation concerning what constitutes the true religion, for according to their philosophy it is not necessary that all should be of one faith. The white man's God need not be—indeed, is not likely to be—the same being as the Indian's God, and here we see how very superficially after all the idea of a Great Spirit affects the aboriginal mind. It has never been made to fit exactly into the Indian pantheon, which recognizes no paramount being, but leaves the thousand-and-one phenomena to the good or bad offices of a thousand-and-one independent spirits, or, perhaps it would be more correct to say, to spirits each of whom is independent in his own sphere, for it is within the power of any one of these beings to create so much trouble on his own account as to compel one or more of the others to "come to time" in any matter of dispute.

The wonder, then, is, not that Iroquois paganism has been to some extent modified by Christian influences, but that it has been modified so little. One must mingle with these people in their homes, in the fields, at their games, and in their long-houses in connection with their feasts or dances, to appreciate fully their mental attitude in this respect. They are utterly unconscious of any similarity between their own and the white mans' religion. They believe that Nivoh, the Great Spirit, has always formed a part of Indian belief, and consequently have no difficulty in accepting the story respecting the four persons or angels he commissioned to communicate with Ska-ne-o-dy-o. Similarly they have no hesitation in the

offering of specific thanks to Rawen Niyoh, and have perfect faith in the intermediary services of the white dog. If we add to these a few suggestions respecting conduct, based on the Christian code of morals, we have about all for which Iroquois paganism is indebted to European culture after a period of more or less direct contact, lasting for three hundred and fifty years. It is questionable whether many other forms of paganism have remained so unchanged for the same length of time, and in anything approaching similar circumstances. It is, indeed, a matter of doubt whether several forms of Christianity and Mohammedanism have not suffered or benefited to a greater extent, even during the space of the present century.

Here we have in almost their pristine simplicity and crudity the music, the songs, the dances, the speeches, and the ceremonies of old, but the origin and meaning have long since been forgotten. Their maintenace is purely conservative. Even the significance of the words of the song is lost, and in many of the ceremonial rote-speeches in connection with the feasts, words and phrases are employed respecting which even the oldest medicine man has no knowledge. In this, however, they are only a few degrees worse than ourselves. The same is true with regard to such customs as the "scattering of ashes," the spraying of heads with sweetened water, the anointing of heads with sunflower oil, and several other rites.

It is interesting, also, to note that all these are indulged in by the half-breeds, and by some who are more than half white, seemingly with quite as much zest as by those of purer or wholly pure Indian blood. It seems somewhat anomalous, at first sight, to observe, engaged in a dance or a dream interpretation, persons of all shades of color, from the darkest (which is darker than mulatto) to a tint that conveys only the slightest suspicion of Indian blood.

But the old-time ways are doomed, and will probably disappear as a system long before the people die out, for the young men mingle more and more with their white neighbors, the young women frequently find employment as domestics in "white houses," and parents are gradually losing their grip of the ancient forms, although they cling tenaciously to the superstitions these typify.

Meanwhile the condition is an extremely interesting and instructive one to the anthropologist, one which in many respects is unique in the history of the world.

THE PHILOSOPHY OF FOLK LORE.*

Folk-Lore is crude ethnology, crude cosmogony, crude everything in science, but beyond all it is crude history, for history to a greater or lesser extent comprehends all the others.

Folk-Lore is of three kinds—purely mythical, purely traditional (or a combination of these), and proverbial.

* This paper was read at a meeting in Hamilton, June 3rd, 1888, and has already appeared in print, or, rather, as a mass of misprints. Since the date of publication a number of requests have been made for copies of the pamphlet (now out of print) of which it formed a part. D.B.

Before attempting to distinguish what is the one and what is the other, let us try, for the time being, to divest ourselves of everything pertaining to what we call civilization—this is not an easy task, but let us make the attempt to forget that we can read—that we ever met anyone who could read, that we know scarcely anything of ourselves, and never saw anyone who knows more. If we succeed in so-doing we shall be for the moment, in imagination, savages.

But even as such we are in possession of a faculty the marvelousness of which exceeds, or is at least equal to, the mystery of life itself—the faculty of thought. All animals think, but in most cases their thoughts are confined to food-supply—or, in other words, their thoughts arise from the demands of the stomach—they are simple. In some of the higher orders thought embraces the interests of the species, and may be admitted as being of a compound character, thus approaching in some degree to human thought, which is so complex in its nature that we designate it "Reason." In other words, the lower animals perceive—man conceives.

Man is a complex thinker; hence, is chief measure, what we now call Folk-Lore. The mythical is purely fabulous; the traditional usually has at least a thin substratum of fact; and the proverbial may be referred to as condensed experience pithily expressed. Now, complexity of thought gives rise to inquiry, which in time becomes inquisitiveness, and, subsequently, investigation. Untutored man at a very early stage in his existence recognizes that manifestations of natural phenomena, are of two kinds, the regular and the irregular, or the normal and the spasmodic. Day after day the sun appears and disappears—with wide intervals the moon comes and goes—the tides operate with regular irregularity; but thunder and lightning, rain and snow, wind and calm have no stated periods. Herein are involved problems he is determined to solve, and which to his own satisfaction he does solve after he has fully accounted for his own appearance in some way equally satisfactory to himself, whether by having emerged from a hole under a hill, by having dropped from the sky, by transformation from pebbles, or in any other of innumerable and equally bizarre ways. Creation myths alone, whether of man only, or of the world at large, might occupy our attention for hours, but all that is necessary for the present purpose is to point out that man's own origin has always been to himself a subject of profound contemplation, the mystery of which he generally clears in a manner highly creditable to his own clan or tribe.

Now, assuming that we have placed ourselves in the mental attitude of primeval man—What then? We are conscious of our existence, and of our surroundings—the hills, the streams, the vegetation, the beasts and the birds; and we are equally so of the heavenly bodies, and a natural phenomena.

It will at once be observed that by no possibility could any but a first pair have been thus brought face to face with so many mysteries simultaneously, but, in any case, the mysteries were there,

and man accepted as his duty the task of accounting for them in some way most consonant with his own intelligence. By this it is not meant that he said to himself or to anyone else, "We must try to find reasons for all these things," but simply that as a result of the fact that he was a complex thinker, the several subjects forced themselves upon his attention, and he formulated this or that theory in line with the facts of his experience. Hence it will appear that myth-makers were not liars or imposters—they were gropers after truth, but, proceeding on false premises they arrived at false or absurd conclusions, even, indeed as many more intellectually gifted ones have done in our own day with all the advantages of learning, and the knowledge of centuries to guide them.

It would not be easy to say just which of the numerous nature-problems untutored man first undertook to solve, or the order in which he took them up. Perhaps no two groups of men approached them in the same order, and we are absolutely certain that no two arrived at exactly the same conclusions, as has already been indicated.

It is admissable, because natural, however, to suppose that our primitive ancestors first tried to account for their own presence here, and next, perhaps, for that of the lower animals on which they were dependent for subsistence. In many cases it is known that the latter were not only believed to have taken precedence on the scene, but that from some of them sprung the human race. It is unnecessary for the present purpose, however, to do more than allude to the fact that this has always proved a prolific source of myth, and one which drove even so highly cultured a people as the ancient Greeks beyond the verge of absurdity, for an explanation.

Then, too, the presence of the earth itself must be accounted for. In Indian legend we have many examples of how this was said to have been brought about, and savage folk all over the world entertain their own views on the subject, just as they do with regard to the existence of everything else.

While the belief has been entertained that the world, the sun, the moon and the stars have always existed, some declare that they had a beginning, and profess to account for how they were brought into being, while nearly all unite in personifying the heavenly bodies, and not a few, too, so regard the earth.

It would appear, therefore, that the only explanation satisfying to undeveloped minds is that which attributes life, and consequently volition, to inanimate objects. The sun and moon travel across the sky—therefore, they know what they are doing—they do so purposely! Eclipses of these bodies are attempts on the part of great bears, or lions, or dragons, or serpents to destroy them and leave the people in total darkness, and here we detect one of the first forms of an almost universal belief in bad spirits. Not only are the orbs personified—they are deified, and this marks another step. The sun especially becomes an object of worship, in whose honor

fires are kept constantly burning, by the attendance of persons consecrated for this very purpose.

Within the last twenty-five years there has arisen a school of thinkers and writers professing to interpret almost every myth, to explain every child's game, and to account for many hitherto inexplicable customs by referring them to old-time sun-worship, and star-worship, and while it is almost certain that this theory has been extravagantly overworked, there is, nevertheless, just as little doubt that a large number of our usages are directly, even although remotely, connected with the worship of those bodies, on the part of our extremely remote forbears, for it must be remembered that not only do "Superstitions die hard," but their ghosts remain with us very persistently, and we become so familiar with their presence that we forget they are ghosts. Wholly gratuitous as it may appear, yet I cannot help recalling in this connection that every day speech contains references to such beliefs in words and expressions like "My stars!" "ill-starred," "unlucky star," "good star," "disaster" and others, just as Sunday, Monday, and Thursday remind us that the sun, the moon, and thunder, were so highly venerated as objects of worship that these days were dedicated to them.

Animism, or spiritism, is also attributed by primitive man, not only to trees, rocks, hills, streams, and even to the air, but to clubs, bows and arrows, spears, canoes, clay pots and everything else of human manufacture, and an immense field for the invention and propagation of myth lies in the belief that all the lower animals are gifted with reasoning power, and the ability to communicate their thoughts to one another.

But traditional folk-lore is on a totally different basis. It may be, and if pure tradition, must be, a statement of fact, the memory of which has been kept alive by the people for ages, but in most cases traditional stories or legends have become so intermingled with what is mythical or fictitious, that due allowance must be made for exaggerations. There is probably not a civilized country without its traditionary lore. Instances connected with the mother countries we all remember—some of us vividly, and even America, new as it is to us, has its Europeanized forms of traditional folk-lore.

Tradition becomes corrupted either consciously or unconsciously on the part of the reciters.

Conscious variations result largely from exaggerations due to a desire to produce effect, and may be either intentional or unintentional. A certain hero was, perhaps, first referred to as a very big man, and in due course he becomes a man between six and seven feet in height—then a man nearly seven feet high—next, quite that height, and subsequently there is scarcely any limit to his proportions.

Again, a great one may be spoken of as having equal ability in the arts of peace as well as of war: in the mouth of some storyteller this takes the form that he has as good a head for the one as for the other, next that he has a head for each, then that he actu-

ally has two heads, after which the number may be increased to suit the convenience of the narrator—hence the stories of many-headed giants.

Variations of the unconscious description arise frequently from stupidity, or sheer ignorance. Certain words in a story may be capable of two or more definitions, or they may be similar in sound to some others of totally different signification, and the wrong word or the wrong meaning is seized upon, because, in all probability, it presents the subject in a more wonder-working or more grotesque manner. An old Norman French word becomes in English mouths *echat* —next ekat, and in course of time the word itself falls out of use, and eventually becomes forgotten, but the story lives of a clever poor boy who long ago rose to wealth and fame by means of his ech*at*, or trading venture, and to-day we are delighted to hear the tales about Whittington and his cat.

I have known a boy exactly of my own age who was very fond of listening to his grandmother's old-time tales, one of which was to the effect that a certain man once discovered an immense store of wealth in gold and silver coinage that had been hidden by a colony of rats, and so much of this money was there, that the lucky finder was enabled with it to erect for himself one of the grandest palaces in the whole kingdom. Now, wholly apart from the probability of the story, which is quite explicable, it is to be noted that this boy, having literally interpreted the words: "Built a fine palace with the money," pictured to himself the four walls constructed of sovereigns, crowns, shillings and sixpences carefully placed beside and above one another, and that when repeating the tale to his companions he always put it in such a shape that this meaning was beyond doubt!

The well-known fondness of young folk, and of simple-minded older ones for such recitals is probably the principal reason for the absurd forms that lore of this kind assumes, and the instances given may suffice by way of illustration, although it would be easy to cite others by the hundred, and the point desired to be arrived at is, that whether the variations were made consciously or otherwise, there was usually no intention to falsify or deceive.

It would, however, be folly to deny that the folk-lore of every land is colored to some extent by intentional falsehood, but even this possesses a degree of value, as will immediately be noted.

Now, it is quite natural, in view of what has been said relating to the origin of myth and the development of tradition that the question should crop up, "Of what use is it then, to pay any serious attention to folk-lore, seeing that in one case it consists of nothing but a series of extremely vague guesses, and in the other, is only a tangled tissue, made up of some truth, some exaggeration, and much that is wholly fictitious? And, quite as naturally, the reply at first thought might be made—it is of no use at all. Indeed this was the way in which, until our own day, the subject was regarded,

but it is a very superficial way to look upon the matter. Delving a little deeper, we come upon paying ore.

Man everywhere is much alike, making due allowance for his surroundings—we are all prepared to admit this, when we regard ourselves physically, but the statement holds good also, if for "man" we substitute, "human nature." We all think, and we all think along similar lines as far as these lines extend. The lower a human being is in point of development the shorter is his line of thought, but short as it is it corresponds with what were the primitive lines of those who have attained to higher planes in the scale of civilization. To one and another branch of our race it has been given to make greater or lesser advances in mentality.

As Britons we may claim with pardonable pride to belong to those, who, before all others, accept the belief in universal brotherhood—that "all men are born free and equal," yet we must admit that all races of men do not possess, or do not exhibit the same capacity for advancement. Some are to-day as they were a thousand years ago—in little more than intellectual infancy—some in boyhood, and not a few in stunted manhood, and yet when we compare the folk-lore of these with each other, or with our own we are surprised to find so many resemblances, because we are all human, and because it is impossible for any human being to get away from himself. A man's loftiest conceptions are limited by his power of imagination, his power of imagination is limited by his knowledge, and his knowledge is limited by his capacity to improve.

In primitive conditions of life we think primitively, that is to say, with insufficient grounds on which to arrive at true results—hence, myth, as already pointed out; and, in more highly organized conditions, of what, in its best sense, we call society, tradition is formulated.

Now, to compare myths and traditions—to trace them to their various sources—to follow their development, and to ascertain their application, is to study the philosophy of folk-lore. By strict methods now well understood we may connect the local legend of some obscure parish in Britain with a story in Persia, or in Hindostan, while, on the other hand, similarities in recital may be assigned to totally different origins. In many parts of the world, for example, we find traditions relating to a great deluge, and, while some of these probably point to one such great cataclysm, it is likely that others refer to different events, although many learned writers claim that all bear reference to the Noachian Flood.

But interpret myth and tradition as we may, their existence brings us face to face with the fact that man everywhere has attempted to account for himself and his environment, and in so doing has exemplified similar phases of thought. It was admitted a little while ago that some times untruths have found their way into folk-lore purposely, but the value of a story is no wise lessened on this account, because falsehood being merely one phase of thought is limited by the same conditions and governed by the same laws. It

is utterly impossible for a man to formulate a lie beyond the bounds of his knowledge, and the grossest untruth that one can put into words for such a purpose is of great value in showing us the limits of imagination in a given direction, as based on the individual's own belief or experience.

The greatest myth-makers, and the greatest encouragers of myth have been the shamans, medicine-men, priests (or whatever they may have been called) of the various cults. To people of this class, we are prone to attribute mercenary or other selfish motives, without taking into account in the first place that they themselves fully believed what their ancestors believed, and, in the second place, that old views were not seldom confirmed, and new ones originated in their minds by virtue of the fasts, flagellations and other austerities they practised.

A most interesting and instructive department of folk-lore that has scarcely been more than mentioned up to this point, and one which would require many papers to itself, is that which relates to national proverbs, combining as they do much that is superstitious, with a large embodiment of common-sense, and constituting on the whole the very best means of arriving at the heart of a people.

But perhaps enough has been said in a crude way to emphasize the thought that there is a philosophy connected with folk-lore, and that the department of human knowledge so-called is not a mass of mere babblements fitted only for our lighter moments.

The folk-lore of Canada, especially of Ontario, and the other western Provinces, is mainly a heritage from the mother countries; still we are not wholly without material of the traditionary kind, quite distinct from our rich aboriginal field, and it should be the duty of some one or more persons to set about collecting these waifs and strays.

There is ample material in this country for a valuable book embodying local superstitions regarding weather, crops, diseases, lucky and unlucky days, charms, and even ghosts, nearly all perhaps possessed of European coloring, but in many instances sufficiently modified by transplantation to give them a peculiar value.

I have no faith in what is called Psychical Research in our day, beyond the limits of what I have alluded to in this paper, namely, a study of the intuitive, or creative, mental forces which have from the beginning led our fellow-beings to personify and deify prominent natural objects, to people the world with monsters and spirits, and to invent apocryphal stories to account for apparently inexplicable events.

It is some such line of study that I would designate as the philosophy of folk-lore.

SOME ETHNOLOGICAL OBSERVATIONS IN SOUTH AFRICA.

By Geo. E. Laidlaw.

During my period of service in South Africa, 1900 and 1901, I was enabled to make but few ethnological notes on account of the rigor and exigencies of the campaign. Spending some five weeks in Cape Town, one was enabled to view the heterogeneous mass of different colored people that probably has but few equals in other cities, certainly not in western cities; all sorts and conditions of crosses between different negro stocks and various races of whites, together with pure negroes, Malays, Javanese, Hindoos Chinese, Arabs, Syrians, Armenians, and other Eastern peoples in their respective costumes, make up a kaleidoscope of local color never to be forgotten. What the product of these in the future will be, as well as the best means of handling the immense native population "up country," is a problem, the solution of which can only be surmised at present. Thus South Africa—the fountain head of the black race—will have a more intricate negro problem than the United States, inasmuch as she is controlled by several European peoples, while the negroes in the United States are under only Celto-Saxon supremacy.

At Durban, in Natal, on the east coast, which is in close proximity to the Zulu country, one could not be but struck with the much finer physical development of the natives, who are principally Zulus, their territory extending up towards the northern interior of Natal Colony. The Japanese "rickshaw" has lately been introduced in to Durban, and the "rickshaw" men are as a rule, Zulus. These most athletic young men of a magnificent physical race leave their native kraals and come down to the coast towns to be "rickshaw" runners. They generally last but a few months; becoming very heated with their work they plunge into cold water, and thus contract pneumonia and other lung troubles, which shortly carries them off, for when ill they become very despondent, and do not respond quickly to medical treatment, if indeed they get it instead of that of their own witch doctors. It is a pity, too, for this class of men are very original and unique. They usually wear a headdress representing some animal or bird, and frequently manage to perform some antics or actions of the creature that they represent during their work, giving imitative bellows, snorts, squeals, and screams to sympathetic patrons. Another noticeable fact amongst the Zulus in Durban and other towns, and not observed beyond Zulu territory, is that when engaged in any outside work, either collectively, or individually, they always sang some chant or song, which on enquiry proved to be addressed to the work which was about to be performed; when in gangs one man took the lead, whilst the rest joined in repeating the words of the leader. These songs are always in native tongue, and practically are the same either in un-

loading a ship at the docks, or railway tracks up country. I recollect one energetic individual working by himself repairing a trek road, singing in a deprecatory tone. His song on being interpreted resolved itself into information which he was imparting to the stone, as to what was going to be done to it. This, I understand, is the base of all their work songs, they address their work or the object to be worked upon, as being animate, and inform it what is going to be the immediate future proceedings. I failed to elicit whether they believed that these, supposedly, animate objects, could understand what was being addressed to them. The Zulus are mentally morally, and physically, the superior native people of South Africa. They have an exceedingly high standard of morality, the virtue of the women being a well-known fact. Until recently any lapse from the path of virtue was punishable by death to both parties, administered by the command of the chief, and was carried into effect by the use of the assagai. Even until quite recently poison was used for the same cause. This code of morality does not include the absolute purchase of a woman out and out; said purchase being transacted between the buyer and the girl's parents or natural guardians, and being recognized as a legal form of marriage, the female taking her wifely place in the domicile of the purchaser. Before the Zulus came under British rule women taken in war or in raids on other tribes were used as concubines. Amongst wealthier individuals possessing several wives, separate huts were allowed to each wife, but all the huts were contained in one kraal. The children of concubines had no hereditary right to property or chieftaincies. Living in a well-favored country, and formerly possessing abundance of cattle, sheep, and goats, and the earth yielding abundance of mealies, pumpkins, and other vegetable food for the mere scratching of the surface, no wonder that the Zulus developed their fine physique and superb carriage, their physical characteristics being tallness, breadth, and squareness of shoulders, coupled with the straightest of backs and high arched chests, carried well forward. Their limbs are massive, with well-shaped hands, and ordinary sized feet. Though stout people, extreme fatness is observable only amongst the women, and is counted a mark of beauty. To produce this stage, a diet largely composed of mealie pap and milk is resorted to, the men not drinking milk saying it is only fit for women and children.

The universal habit of wearing rings on their legs above the calves, has a tendency, as they believe, to develop the calves to an abnormal extent. These women also wear similar articles of brass, copper, or iron, on the arms at the wrist and above the elbow, and on the legs at the ankles. They are often put on when the wearer is young, and accordingly as that person increases in growth these become permanently fixed and can be removed only by cutting. It is no unusual sight to see a Zulu—or other native for that matter, as the custom is universal—having three or four dozen of these articles on his limbs. These

PLATE 1.

Fig. 1.—(16,862). Anklet of small native wrought iron "sleigh-bells," from Bihe, Angola. Mrs. John Currie.

2.—(22,241). Small wooden pillow, carved from one piece, Zululand. Lieut. Geo. E. Laidlaw.

3.—(22,129). Horn comb, Basutoland. Lieut. Frederick Hamilton, Globe correspondent.

4.—(16,860). Native copper, Garanganzi country. Mrs. John Currie.

5.—(22,131). M'kosa pipe, Zululand. Lieut. Fred. Hamilton.

6.—(12,438). Female wooden figure, Brass River, Guinea coast. W. P. Byrch.

7.—(16,848). Spirit-dance axe, Bihe, West Central Africa. Mrs. John Currie.

8.—(16,849. Musical instrument (iron tongues on wooden board), Cisambo, Angola. Mrs. John Currie.

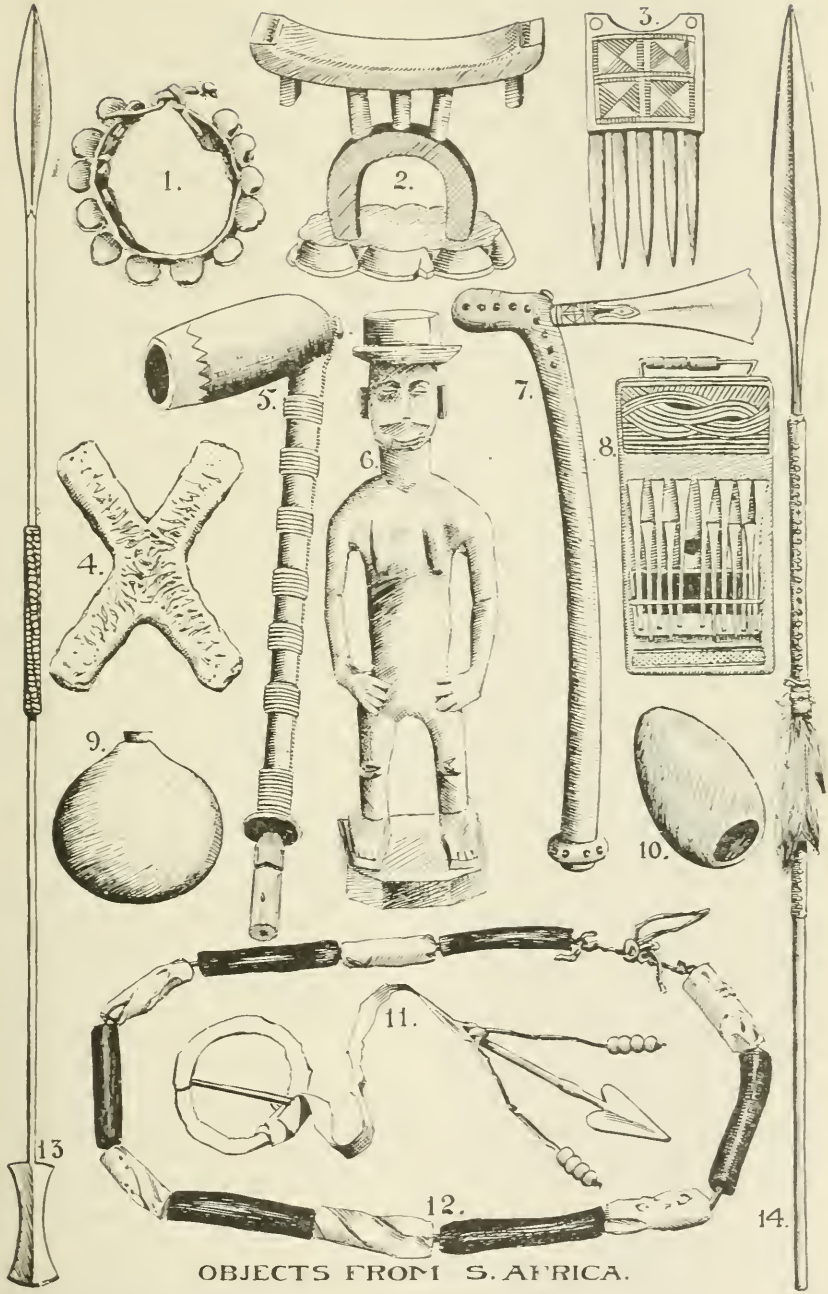
9.—(22,114). Snuffbox, made from a small gourd, Zululand. Lieut. Fred. Hamilton.

10.—(22,116). Zulu doppy, or private purse, Elandsfontein. Lieut. Fred Hamilton.

11.—(22,109). Nose cleaner. Facetiously known as a "pocket handkerchief." Procured from an old woman 20 miles north of Sand River, Orange River Colony. Lieut. Fred. Hamilton.

12.—(22,127). Necklace of shell and wooden beads, Basutoland. Lieut. Fred. Hamilton.

13—14—Assagais or spears, Angola. Mrs. John Currie.



OBJECTS FROM S. AFRICA.

Plate I.

wristlets, armlets, anklets, or bracelets are woven out of very fine pliable wire by the natives themselves, and have a thickness varying from that of an ordinary straw to that of a lead pencil, and are valued at from 3d. to 1 shilling. The other portions of native dress used in ordinary wear, are sandals made of hide, sun dried, with a loop to go over the big toe, used occasionally, and the "moocha," which is a girdle with a small apron of about six by nine inches, made of skins of small monkeys or other diminutive animals, hanging in front, and a tuft of tails of similar animals hanging behind: this is worn by males. The females now use short petticoats of cloth, except in remote kraals, where their ancient dress is in vogue, namely, a skin petticoat or apron. Skin karosses are used at night to sleep in, and on cold wet days. The trader's gaily colored "Kaffir blanket" is now taking the place of the kaross. In extreme hot weather clothing is discarded almost altogether, the younger children of both sexes wearing nothing at all excepting an ornament.

In preparing for a public "beer drunk," or a dance, or other native festival, both sexes deck themselves out with as much native finery as they can obtain: men with feathers in their hair, and tufts of feathers and hair tied on to their arms above their elbows and their legs below the knees. A great deal of bead-work in the way of necklaces, belts, and collars is worn by both sexes.

It is extremely rare to find any naturally deformed individuals amongst the Zulus or kindred tribes. The features are not unpleasant, and in many cases have a decidedly Hebraic cast.

The word native in this article means a negro. The same word in South Africa—as used by newspapers, business men, and others, refers to a Hindoo or an East Indian. All negroes in South Africa, with the exception of perhaps the almost extinct dwarf Bushman, are called Kaffirs by theBoers and colonials. The hybrid negro at the Cape rejoices in the cognomen of "Cape Boy."

"Kitchen Dutch is the language generally used when addressing negro servants and work people. This bears the same relation to High Dutch that the French- Canadian "habitant" patois does to Parisian French. Kaffirs that come in contact with whites in the way of employment and business are ever so much more docile, willing, polite, and obedient than the north American negro. No doubt from being near their primitive source, they have the stronger animal passions, as is usual with more primitive peoples than their American relations, and do not possess the same facilities for education, business, independent work, and political advancement. They have been brought to their present stage of submissive docility by loss of territory and a long-continued and frequent use of the "sjambok" and rifle.

The Boer method of negro employment is based on the maximum of service and minimum of pay. A Boer farmer does not do manual labor himself; he has Kaffirs. These Kaffirs are permitted to settle on his farm in kraals, for each hut of which they must pay £1 per annum taxes to the Government. They are allowed a mealie

patch sufficient for their needs, and a few sheep or goats. They render service such as herds, farm laborers, or household servants at low wages, thirty shillings per month being a high rate for contract labor on roads, railways, and teaming in the public service. It is said that sometimes after several years' service a Kaffir will have to content himself with an ox from his Boer "baas."

Independent Kaffir chiefs or head men of large kraals have to furnish so much labor on the Government roads, acording to their district. Labor to be performed when called upon.

Natives living in unsurveyed lands in the Transvaal still have to pay the £1 tax per hut, but may have as many goats, sheep, or other stock as they wish, and are thus practically independent of work, though large numbers of them work in the mines at Kimberley, Johannesburg, Klerksdorp, Jaegersfontein, and other places. The ordinary negro will work very faithfully. The Zulus make by far the best personal and domestic servants, being reliable and truthful, priding themselves on their honesty, morality, and fidelity, but can not be forced to work; in this way they resemble the American Indian and many other people. The kraal Kaffirs or "Red Kaffirs" are those who have not come under the influence of civilization. They live their old wild life, with slight modification due to their present environment, such as decrease of game, and in not being permitted to indulge in petty tribal wars, or carry modern arms—the Swazis and Basutos are exceptions to the latter condition. Their immoral dances and "beer drinks" are also put down, the war dance being the only one allowed.

The "beer drink" is sometimes indulged in when they can do so without interference from those in authority, and it consists of an invitation from one kraal to another to drink beer. The beer is made from mealies, or Kaffir corn—a very small grained corn, different from the large kernels of the mealies, which resembles our ordinary Indian corn, or the common maize, the process of manufacture being short and simple. The grain, a little on the green side preferably, is crushed on a flat mealing-stone, similar to a Mexican "metate," by another smooth, rounded stone, generally ovoid in shape, and of a size large enough to be held conveniently in both hands. The mass of crushed grain is put into large earthenware pots and covered with water. This is allowed to ferment, and is then strained, when it has the appearance and taste of buttermilk, and an individual has to consume a large quantity before intoxication ensues. These "beer drinks" end in an orgie, in which both sexes take part in dances and songs, moral and immoral, and in boastful speeches.

The "Red Kaffir" corresponds to the "Blanket Indian" of America. Between the "Red Kaffir" and the negro who is civilized and settled down on his farm, or to a trade such as that of a smith or a carpenter, there exists another class, semi-civilized, who live in kraals, when not employed, and who only work to gain enough to support them for some months in idleness and ease, decked out with

tawdry finery, and cast-off European clothes. This class finds employment as navvies on railway lines, and roads, also in the mines and on large stock farms, and as drivers on trekking expeditions. The civilized negro possesses a status similar to that of the civilized Indian in America, with the exception of much less union in marriage with the whites than falls to the lot of the Indian. Indeed, marriage between white and negro, or those having negro blood in them to any extent is seldom heard of in South Africa.

Numbers of Zulus and Kaffirs are enlisted in police forces. The Natal government employ a large number of Zulus to police their country. These are attached to, and act in conjunction with, the Natal government police on the border, and being officered by white men, do very efficient service in controlling their own people. In towns native policemen are also used, and are found to be very effective in quelling disturbances and suppressing minor crimes amongst the colored population. They do not arrest white men perpetrating crime, that is left for the white policemen, but may be used in tracing up crimes and misdemeanors committed by whites, and they are also employed as guides.

As the South African negro has an inordinate love for liquor or intoxicants, equalling, if not surpassing, that of the Red Indian, the authorities do not permit the selling of those commodities to the natives, the penalty being imprisonment or a heavy fine. Uncivilized or semi-civilized negroes have no voice in political matters in British territory, and no negroes had a vote in the Boer country. I was not able to ascertain definitely very much concerning the aboriginal religion. They believed to an extremely large extent in spirits, fetishes, and the supernatural powers of "witch doctors," and were consequently very superstitious. Missions have been established for such a length of time, that the pure, untarnished, native religion no longer exists in the territories alluded to, except in rare cases.

Referring to the effect of missions on the native population in general, it is a noteworthy fact that while the moral Zulu women, especially the younger ones, stalk about the precincts of their native kraals in Mother Eve's costume, they have no sense or idea of shame, and after a sojourn at a mission become aware of that fact, and also, it is said, become cognizant of the possibilities of immorality. They seldom, if ever, return to their tribe, preferring to live where they can obtain employment. If they return they rarely go back to their primitive dress, using the costumes of their white sisters.

Zulus are spoken of as the "gentlemen of South Africa." Kaffirs and Zulus always make up a name for a white man from some personal characteristic or attribute, and use these names amongst themselves when speaking about or referring to the man in question,

Localities of Tribes.

Zulus, or, more correctly, Amazulus, occupy the northern and western portion of Natal, touching the Drakensberg range of mountains, which forms the boundary between Natal and the Transvaal. Their influence formerly extended many miles in every direction, even up to the northern part of the Transvaal, many miles distant especially so in the Crocodile valley, in the Lydenberg Mountains, where the remains of many large kraals, said to have been demolished in Chaka's time, can be found almost on every strategic point. These former domiciles belonged to the now nearly extinct Malpoks, a physically smaller race of people, said to be very treacherous and revengeful. These people are allied to the Sekekunis, who take their name from a chief, and who live in the vicinity of the Limpopo River. The Malpoks extended north as far as the Sabi River, which is south of the Limpopo, flowing east. On the east side of the Transvaal is Swaziland, occupied, as the name infers, by the Swazis, who are an offshoot of the Zulus, resembling them in many ways, both in speech and customs, with but slight modifications. This tribe was founded by a powerful chief who refused to obey, or, failing to carry out some of Chaka's orders, fled north with many of his followers, and set up a kingdom of his own by conquering and absorbing the weaker tribes that occupied this territory. He gradually became very powerful, and this nation to-day is one of the very few that remain intact. The Swazis are slightly physically smaller than the Zulus, owing to the absorption of people of less stature.

The Shangaans, who are north of the Swazis (in Portuguese territory) are slavish, treacherous and licentious, and have the name of profiting out of their women's virtue.

Swazis and Zulus are of the same Bantu stock, which embraces the Matabeles, Mashonas and other tribes in Rhodesia.

South and east of Zululand, at some distance away, in a very mountainous district, to the east of the Orange Free State, now the Orange River Colony, and directly east of the Orange River, is Basutoland, where live the Basutos and Sosutos, possessing all the characters of mountaineers, brave, free and independent. This country is a protectorate of Great Britain.

East and south of Basutoland, reaching north up to Natal and east to the sea, is the territory formerly occupied by the Kaffirs (Caffres), formerly called Caffraria, who were little, if any, inferior to the Zulus, but have long been in subjection to the British.

The major portion of the Orange Free State was occupied by the Baralongs, a physically inferior race, inhabiting the Karroo and Kalahari deserts. The most notable physical characteristic of this people being a protuberant stomach, produced by the vicissitudes of life in stony deserts.

West of these, again, live the Griquas, who are much lighter complexioned people. South to Cape Town the country was occu-

pied by dwarfish Hottentots, amongst whom in isolated cases dwelt the still more dwarfish and almost extinct Bushman (Boer, Boschjemen). I have seen only one hybrid specimen of this people, and he was a small, wizened-up piece of humanity, who might be well called a man-monkey.

Kraals.

As one might suppose, all these tribes are virtually the same people, existing under similar conditions, with the same kind of food, and climate. Thus, their modes of life, their tribal government, their social and sacred usages, their manners of war, hunting and cultivation of the ground, together with their implements, ornaments, and weapons, vary but little. Starting with their kraals, we find that the beehive shape is maintained throughout the country, only changing when in long and close contact with civilized communities, when it is often exchanged for the square or oblong house, containing one or more compartments, and still having the small wattled pens attached, as is common with the remoter kraals. These beehive huts consist of a circular wall of about four feet in height, and up to twenty feet in diameter, covered with a conical roof of thatch of reeds or bamboos. The material of the walls may be stone or sun-dried clay, and each hut has a small enclosure, court yard, or pen, attached to it, with stone or mud walls of a height up to six feet. In places where bamboos can be obtained they are used for walls of enclosures, sun shelters, watch towers in their mealie patches, and even for the walls of huts. A group of huts together will each have its enclosure, and these are in such a position as to be on the farther side of the huts from centre of kraal their walls forming a barrier or protection. These enclosed courtyards are paved with clay pounded hard, and the stones of hut walls and enclosure walls are set in clay for mortar, while clay walls for huts and other purposes are not rare. In every large kraal or group of huts, there is one hut set aside for a communal storehouse, in charge of a person where supplies of grain, food, weapons, and the property of absent people are kept. Huts have small wooden doors fastened with thongs and hinges of raw hide. They have no windows. The floor is of pounded clay, tempered in some cases with bullock's blood. The occupants as a rule keep these huts very clean, and they are swept out regularly. The fire is built in the centre in inclement weather, the smoke escaping through the roof, the fire-place being simply several large stones rolled together. There are never any shelves or other conveniences in these huts, beds being rolled up and placed at the foot of the wall, household utensils ditto, smaller articles being kept on the top of the wall, where the roof projects, or they are suspended from the framework of the roof. The bamboo sun-shelters above referred to may be either an extension of the roof around the hut like a verandah, or a separate structure like a shed, supported on posts. These

shelters are more common in the Northern Transvaal than elsewhere.

The square or oblong huts occurring in the most civilized communities are constructed of sun-dried adobe clay, or of stone, with a thatch roof. Those that are communal, or containing several apartments have a door to each division and small window places, floors being of the usual pounded clay description.

The extensive ruins in the Lydenburg district before referred to, and which were generally situated on a rise or a hill, seemed to have possessed a system of terraces. They abound in mealing stones and in coarse pottery fragments not unlike pottery from Ontario village sites, in material, but without any incised ornamentation. In some cases descendants of the old people live among their ruins or in vicinity of them. I am not aware of any systematic excavations having been carried on in these places, but was informed that several attempts had been made and abandoned because the material recovered consisted mainly of mealing stones.

The word "kraal" is applied indiscriminately to single huts, groups of huts, and enclosures for live stock.

The cultivated ground is immediately in the vicinity of kraals, and the cultivation is carried on by means of large heavy mattock-shaped iron hoes, wielded by the women. Mealies, Kaffir corn, pumpkins, and tobacco being the principal crops raised. The watch-towers built for overlooking the fields are constructed of bamboo, if obtainable, if not, of any kind of small trees. They are simply small shelter huts raised on four posts, in which persons are stationed at night to watch the crops and give alarm on the approach of destructive animals.

Pigs, dogs, and fowls swarm around the kraals, little nests of stone and clay being constructed for the use of poultry. These nests may be several in a row, or single ones. The stone slabs are set up in shape of a box, leaving the front open; then the bottom is raised with clay, to form the nest, about half a foot to one foot in height. The little enclosures or courtyards around the huts are constantly swept out and kept clean.

Implements, Ornaments, Weapons, etc.

The ordinary working tools of the Zulus and Kaffirs consist of heavy "bush knives," of every description from "machetes" to a "bill hook," and heavy hoes and sickles, these of course are obtained from traders, and are the only implements noticed for agricultural purposes, spades or axes not being observed in use.

The weapon of the South African native is par excellence the assagai, which has two distinct uses, stabbing and throwing. The stabbing assagai has a shorter handle than the throwing assagai, and generally a longer blade. The blades have variation of form, such as are preferred tribally or individually, the Zulu preferring a large wide blade, leaf-shaped. Some of the other tribes use a long narrow blade, and, again, others a small leaf-

shaped one. Assagai blades can now be obtained from traders but formerly they used to make their own from native smelted ore, but when iron could be obtained from other sources it was quickly utilzed for the same purpose. A lot of native-made assagais on examination look as if they were made of old bolts. The shafts are made from iron-wood (umsin beech), a very hard, lark, heavy durable wood. Shafts are about as thick as an ordinary finger, and have very often a small knob at the butt end. Where the shank of the blade enters the shaft it is sewed with woven wire or plaited strips of bamboo done in a pattern to strengthen and prevent splitting. When the shaft is very slender it is strengthened by selvages of wire woven into patterns, some times sections of the skin of some animal's tail, taken off without splitting, is drawn on the shaft, and shrinking in drying answers the same purpose as the wire. The skins of tails are very often used by just drawing over the butt of shaft, thus having a bunch of wavy hair for ornament. In throwing the assagai a trembling or quivering motion is given to it. One kind of blade is of zig-zag cross section, something like the letter Z, with long terminals, presumably to give it a rotatory motion. This blade is four by one and a half inches in size. Some stabbing blades are twelve or thirteen inches long and from one to one and a half wide. Shafts of throwing assagais are about four feet and over long, and stabbing assagai shafts are about two and a half or three feet long. The next offensive weapon to the assagai is the knob-kerrie. This is made of iron-wood, and is, as the name implies, a large round knob on a slender shaft; as a rule the diameter of knob is three or four inches, and the length of shaft about two feet. Those most prized are kept for a long time, and are much polished and worn. If they are made from the heart of the iron-wood, which is a very rich brown or black in color, showing a white "moon" on the side of the knob, which is due to the presence of the white sap-wood, they are much more highly prized. The uses of the knob-kerrie are either for striking or throwing.

Battle-axes are third in order as regards numbers and use. These are of a peculiar shape, generally a semi-circular or half moon blade, with a tang projecting from the back which fits into a short handle, and being clinched on the opposite side. The blades are about six inches long by three deep, and tangs about three inches long. The handles are about two feet three inches to two feet six inches long, and have a slight backward curve at the blade end. They also are made from ironwood. The blade is generally at less than right angles to the proximal end, so as to give force to a "drawing" blow. See fig. 7, plate 1. Some blades are triangular shaped. Blades project an inch or so from handle and resemble a saddlers' knife. Traders now supply battle axes to the natives.

Shields are oval shaped, and range in size from the small toy shields of the boys, a foot or so in length, to the huge war

shields of four or five feet long. They are made of dried ox-hides with the hair outside. There are two medium sets of parallel cross incisions the length of the shield, through these, when green, are pulled two strips of another hide, leaving two large loops on the inside about the centre as a means to support the shield. These shields are very light, and when not in use or to be stored away, can be dampened and rolled up in a small roll, and when to be used again can be re-wetted, unrolled, and dried, when they regain their former shape.

Walking Sticks.—Every male native when he travels or walks about carries either one or two sticks that serve as walking sticks. Sometimes these are elaborately carved. One in my possession has five baboon faces in relief underneath the circular flat top, and on the flat surface a rude incised representation of the sun. Though this was obtained from natives in the Northern Transvaal, it is supposed to have travelled thence from the Mozambique coast, and was of great curiosity and desire amongst the Cape Colony natives who saw it. The head-wives—or umfazis—have a short stick or cudgel to keep the rest of the family in order. These are made of the ground olive, and are called "umfazi sticks," and seem to be used as general correctors or castigators.

Karosses are rugs made of tanned skins of wild and domestic animals, and are used for sleeping in, and are worn in the manner of a blanket in cold, wet weather. They are square in shape, and about four feet wide. An occasional one deviates from the usual shapes, one in my possession being semi-circular and composed of portions of skins of giraffe, leopard, and another animal.

Bamboo bed-mats are made of lengths of bamboo about three and a half feet long and one inch or so in diameter. These lengths are fastened together in a single layer by strings running over and under, at the ends and in the centre in several places. They are about six feet long, and in daytime are rolled up and placed out of the way. Rush or reed bed-mats are also made in a similar way, and are used in a like manner. I have seen women making these mats. They use no frames. Bamboos are also used for fences around kraals and for small enclosures, being made by sticking the butts into the ground close together and having several courses of transverse pieces for supports. These fences are never more than a few yards in length, no fences being needed for their "mealie patch," as their domestic animals are always herded; this is a resultant from the lack of timber. Large rush baskets are made circular in shape, having a somewhat contracted mouth, and are sometimes, dyed, or stained in different patterns, their use being principally for the holding of grain and other commodities in the storage huts.

Clay pots are also made and are usually very large and of a red, black, or brownish yellow color. They are baked very hard, have smooth surfaces, but are not glazed, and very often have colored simple designs. I could not discover what materials were

used in coloring. The pots are simply used as receptacles for water in the hut enclosures, or for holding food in the storehouses. I do not know of their being used for cooking at the present day, being superseded by the iron pot of commerce. These large pots are globular in shape, with a smaller, contracted circular neck several inches in height. Calabashes and gourds of various shapes are used as domestic utensils. Wooden spoons and ladles are of frequent occurrence, also food trays and dishes of same material. The absence of stone tools was noticed, and especially the non-occurrence of flint or kindred material. Though there are some paloeoliths from South Africa in Cape Town Museum, only two specimens of artificially perforated stones (native work) were picked up by the writer on an ancient site at Twyfellaar, Carolina district, Transvaal. These are two flat slate pebbles less than the palm of the hand in size; perforations similar to perforations in this country.

Wooden pillows are used in sleeping. They fit into the neck, and may be in style from ordinary blocks of wood to highly carved little stools. The ornamental form most in vogue is that of some elongated conventionalized animal shape. This sort, about eighteen inches long and up to about six inches high, consists of a bar with four rude legs, and occasionally a tail at one or both ends. Those carved similarly to a camp stool are much shorter, generally less than a foot in length.

Mealing stones and mortars. These are of every size from the small cup mortars for grinding snuff to the large basined and flat metates for grinding grain. There is an abundance of these in every kraal, and even on farms remote from settled communities. The upper stones or pestles are of ovoid and other rounded shapes and resemble very much that class of stones found so frequently on aboriginal sites in this country; so much so, that a series from each country would be indistinguishable except by their material.

Reims are long strips of sun-dried bullock hide, used for a variety of purposes, such as binding, tying, mending, similar to the shaganappi of the Canadian North-West Indians. "Reims" is a Boer word.

War-horns are made from extremely large bullock's horns, are scraped and polished, having a hole bored on the inside curve about eight or nine inches from the tip, with a diameter of about three-quarters of an inch. Some of these horns are about three feet in length, measured along the curve, and have a diameter at large end of as high as eight or nine inches. The sound produced is a deep boom.

Tom-toms and their uses are generally well enough known nowadays not to be described minutely here. One was seen which was covered with rock python's skin. It was about one foot in diameter and four inches deep, and was particularly noticeable for the peculiarity of the tightening process. This consisted of a series of running stitch loops in the edge of the skin, which was large enough

to lap underneath the circular wooden frame of the instrument, then another series of loops with a selvage string was interlaced outside these running loops. By pulling the selvage string the required degree of tautness was obtained. Locality, Pilgrim's Rest, North Transvaal. The only other musical instrument noted consisted of a bow about three feet long, with several strings. At the back of the bow is fastened a large calabash or several smaller ones. Sound is produced by twanging the strings, which give forth a sort of thrum.

As the Zulus and Kaffirs are much addicted to the use of snuff they carry the requirements of this practice constantly with them, the snuff-box being a tubular affair of dried skin covered with bead-work. This is worn on a bead-work collar, or is a portion of the collar. The size runs up to six inches in length by one inch in diameter. The taking of snuff is done by the means of a small slender horn spoon, which is carried stuck in a hole through the lobe of the ear. These spoons are very finely made, the handle being long and slender and pointed, so as to prove useful as a head-scratcher, the bowl shallow and about the size of a finger nail; sometimes a pattern of incised lines occurs on the handle. Porcupine quills, also used as head-scratchers, are likewise carried in the ears.

Necklaces other than bead-work collars, are made of a variety of objects, lions' and leopards' claws being most highly esteemed, because rare. Then they have necklaces of traders' beads interspersed, with seeds of trees shaped like the kernels of almonds and similar in color, also of short brown cylindrical beads of sacred wood alternated with teeth or shells ground into discs. The wooden beads average three-eighths of an inch in diameter, and up to three-quarters of an inch in length; discs three-sixteenths to half an inch in diameter. One necklace obtained from the wearer, a middle aged negro, was made of small angular black stones, having eleven facets. The stones resemble slate very much, and I am informed nearly always occur of the same size or shape. When they vary they are ground down to resemble the rest. There are 162 stones in this necklace, comprising a length of three feet four and a half inches, and strung on horsehair. It is of native make, perforations neatly made, and just large enough to admit several horsehairs.

Bridal necklaces of large globular beads consist of strings from ten to twenty-four feet in length. These beads are of various colors, and are interspersed amongst the ordinary smaller beads, both sorts being procured from traders, and are not of native make, material being glass or porcelain. They are arranged with a regard to the order of the recurrent colors, and the alternation of the larger and smaller beads, fixed rotations being preserved, two or three colors only being used for each necklace. The bead-work collars and belts used on festive occasions by both sexes are simply ropes of some material sewed around with strings of beads of vari-

ous colors, so as to present an appearance of solid colored sections occurring with regularity. The collars have a little square flat pendent tab of bead-work in front. The bead-work belts worn by the Zulu women have a width of several inches, and are loose, fitting over the hips, with a square bead-work piece about the size of an envelope, pendent in front. A belt and a necklace are usually the entire costume at a dance. Ordinary and children's bead necklaces among the Zulus are of several parallel rows of strings cross-fastened, and sometimes tabbed. The beads are strung on horse hair, strands of native twine, and "reims." The mode of fastening the above articles is by a loop and a brass button.

Feathers and tufts of hair form special adjuncts to ornamentation of persons, and the display of savage finery in war dances, etc., feathers being principally those of the ostrich and the long curly tail of a thrush (Kaffir, Sackaboula), which grows once every three years, and is much prized. The tufts of variously and naturally colored hair, and the tails of animals are extensively worn by the Zulus. These are fastened below the knees, above the elbows, and around the ankles. They do not seem to possess any method of dyeing white feathers, hair or quills with various brilliant colors as the Red Indian did. Phallocrypts, or private purses, are worn by all males from ten or twelve years old up, and are generally made from a nut resembling the vegetable ivory nut, and are now obtainable from traders. They are commonly called "doppies."

Charms of various sorts are worn extensively, and often consist of tips of horn polished and perforated, and suspended from a necklace. Buck or goat horns are filled with grease of various sorts, sometimes with needles buried in, and are placed in the thatch of the kraal roof for fetish reasons. I could not ascertain if they were thus placed to bring harm to the occupant, or believed to be a protective agent.

Graves.

The only place where I noticed native graves was in the vicinity of a large kraal on a slope of a rise between Ventersfontein and Reddersburg, Orange River Colony. There were about seventeen or eighteen, and each grave had a solid circular covering of flat stones up to a diameter of 10 feet. Venereal diseases are very prevalent in the vicinity of mining districts; in some localities as high as 90 per cent. are affected.

Modes of Wearing Hair.

The Zulu married women wear their hair in the shape of a truncated cone projecting from the back part of the head, and colored a deep brick red, which resembles very much a Turkish fez. Foreign substances are added to give this mass a solid appearance.

The head men of Zulu kraals are known as "ringed men," from the custom of wearing their hair in a ring around the crown of

the head, the rest of the head being shaved clean. Foreign substances are added to and worked in with this ring till it is solid, hard, black, and as polished as ebony. Younger men, or men not being the heads of families or not warriors, are not permitted to be "ringed." This custom is prevalent in other tribes. In the Lydenberg district of the Transvaal young native women grease their hair and then powder it with a yellow clay. This custom is not observed elsewhere.

In the eastern part of the O. R. C. young boys were noticed who had one-half of their heads shaved clean, the dividing line being from the centre of the forehead to the nape, and it seemed that as after a while the other part would then be shaved, as in these cases the hair that was left was very short. As this was near the Basutoland border the natives were Basutos or of Basuto stock. In the same locality male adults who had beards—which were very sparse—had these curled into several little corkscrew-curls of a few inches in length. As many as six were noticed in one instance.

Odd Customs, etc.

In the Clocolan district, Orange River Colony, several native children of tender years were found up amongst the rocks, high above the river, making toy animals out of clay. These were modelled very well, considering, and all the main features were well worked. The sun hardened them rapidly, so that they became quite durable, and they represented domestic animals, cattle principally. "Witch doctors" play an important part yet in the lives of these peoples, but all bloodthirsty ceremonies, such as "smelling out witches," and the like, are put down by the respective territorial Governments. The present day "witch doctor" is generally an old man, having a hut set apart for his own use in the kraal where he lives. I had not much chance to investigate along this line, but found that they occupy pretty much the same sphere in tribal negro life that the Indian medicine man does in America.

Dakka—a native wild hemp, is used for smoking. This produces a species of intoxication, followed by a stupor lasting for several hours. The dakka is tied in bunches and hung up to dry. It needs no other preparation than crumbling and putting into the pipe. Male adults, young and old, sit around a fire, the pipe is filled and passed around, several draws are taken by each, and the pipe passed on. The immediate effect is a great deal of suffocating coughing and excessive expectoration. Then follows semi-intoxication, in which the partakers relate boastingly of various deeds performed. As the pipe circulates more talk, cough, spit, and jabber follow, till all are wrapt in a stupid sleep. Personal encounters sometimes take place on such occasions, when sticks are pretty freely used, but serious damage is seldom done.

The pipes are made from cow's horns. The large end is plugged up, and a "mouth hole" cut in about one-third way from

the tip. Then another hole is bored near the larger end, and a six or eight inch length of bamboo inserted. The bowl fits on top of the bamboo, and is made of soapstone if obtainable. The shape is similar to an hour-glass, one end for the dakka and the other fitting over the bamboo. The capacity of the bowl is that of an ordinary pipe. Stone inkbottles of a small size have been known to have been utilized for bowls for these pipes by fitting the neck over the bamboo and breaking the bottom of the bottle off. The use of dakka is general throughout all the tribes, and its effect in the long run is the same as that of opium. Tobacco is smoked separately, and is not mixed with dakka, the latter being preferred to tobacco either of native culture, of of white man's growth Sometimes when not possessing a pipe and wanting a smoke in a hurry a Kaffir will poke two little converging holes in clayey ground, and filling one of them will light it, drawing the smoke through the other.

Snuff is ground in little cup mortars, from native tobacco, and is invariably used.

The only gambling noticed was done with cards. A game similar to "banker" was played, ordinary lucifer matches being used for counters, or to represent values.

Salutes.—On meeting prominent white people the salute was the two first fingers of the right hand held extended straight up above the shoulder, in conjunction with the audibly spoken word "Inkoos" (chief). The royal salute given to the Zulu royal family was the same gesture with the words "Bay e le." If the hand is holding a stick, assagai, or knob kerrie these are held up and not released.

The egret is a sacred bird amongst the Zulus, and is not harmed. It is pure white in color. Fish are not eaten by Zulus, who say that fish and snakes are closely related. They will not even eat the canned fish of commerce. Liguanas, large lizards of several feet in length, are eaten by some of the tribes. Locusts are gathered up in large quantities and dried, stored away in baskets, and pots for the general food supply. I do not know in what manner they are prepared for use, whether they are used by themselves, or are pulverized and used with "mealie pap," but I frequently saw them stored up in the kraals.

Mealie pap corresponds to the American cornmeal "mush."

Biltong or dried meat is beef principally, cut into long strips, slightly salted if salt is obtainable, and sun-dried. This being done around the kraals and under the bamboo sheds. The native domestic animals are ponies, cattle, sheep, goats, pigs, dogs, and poultry, but it is hard to determine the original stock, owing to the frequent use of imported animals from Europe. The Basutos claim that they have had their hardy little ponies from time immemorial. The cattle seem to be of two distinct races, the smaller having a hump on the shoulders, like the Brahmin cattle of India, and originally coming from Madagascar, and are called Malagasay

cattle, the other kind being a variously colored, small, roughly-shaped beast with large horns. The Zulus had a larger run of cattle, owing to being in closer proximity to white settlements. The sheep are drop-eared, goat-like animals, with scanty wool, colored in patches, black or brown on white ground. Goats are the ordinary African goat. The dogs are so crossed with imported greyhounds, for coursing purposes, that the original stock is indeterminable. This cross has taken place of late years, since the natives are disarmed and not allowed even assagais. They improved their dogs to course small "buck" and rabbits. Beer strainers are a woven grass bag of about four inches in diameter and one and one-half feet long. One in my possession is made of twisted grass cord in the following manner: A two-stranded, twisted cord has been spirally wound round a core, and then a single twisted cord has been taken, and, starting from the top, has been passed under and over till it reaches the bottom, then back again to top in same manner, only passing on the opposite sides of spirals, when it reaches the top it is knotted with its other end and cut off. This is repeated till the bag is made. The top spiral is loose enough for about three inches of the cord to be drawn out to a loop for suspension purposes. The top of the bag is open, and the bottom is closed by the spirals being abruptly lessened in diameter. Fly whisks are made of a bunch or tuft of long hairs from horses manes or tails inserted into a short handle.

The natives use ant hills for ovens. These ant hills have an exterior coating of hard worked up clay, are dome shaped, and as full of galleries and passages as a sponge. It is only necessary to cut a hole in for the reception of fuel (dried dung), another for a draught, and then put your cooking utensils on and proceed.

The most frequent variety of stone or rock occurring are sandstone and slate, and quartz and shale in the mining district. Limestone is absent except in vicinity of Pretoria. The country is treeless and waterless, except in mountainous and the coast districts, also along the large rivers. A very large area is desert.

Oranje Vrij Staat (Orange Free State) now Orange River Colony. The absence of bows and arrows is noticed through the country. These, if ever used to any extent, were superseded by firearms, and now that the natives are disarmed of the latter they have not resorted to the former. The bushmen dwarfs still use poisoned arrows.

G. E. LAIDLAW,
Ex-Lieut. Strathcona's Horse.

INDEX.

Algonkin beach, 58, 59, 69, 72, 74, 78, 88, 92.
Animal forms, on clay pipes, 114
Animism or spiritism, 117, 128.
Ant-hill ovens, Zulu, 149.
Assikinak, 52.
Attignenonghac, situation of, 68.
Axe, iron, with rude design, 86
Banner stone, unfinished, 18.
Bear-tooth knife, 102.
Bark coffin, 42.
Bass Lake 64.
Basutos, 137.
Bayfield's survey, 60.
Bead, clay moulded, 101.
Beaver-dams, 41.
Beer-drunks, S Africa, 136-137.
Biltong, S. Africa, 148.
Black-race in South Africa, 132.
Boer payments to negroes, 136.
Brass kettles in ossuary, 77.
Bronze medal and spoon on Indian skeleton, 42.
Bronze tomahawk, 42.
Brotherhood, universal, 130.
Burial, temporary, 72.
Burial, Scaffold, 83.
Burials, first and second, 71.
Burials in Medonte, 71.
Burials in Yellow Point mound, 26-27.
Cahiague, 89.
Carbonized corn, 86.
Card-playing forbidden, 121.
Cape boy, 136.
Carnivora, 50.
Catlinite objects, curious, Sandwich, 20-21.
Champlain, 63.
Champlain and Brebeuf. Their landing place. 59.
Charms, Zulu, 146.
Christian conversions among the Iroquois, 116.
Children, treatment of, 121.
Clay pipes, ringed, 77.
Clay pipe making, 111.
Coldwater trail, 71.
Colors of cardinal points, 117.
Cord Nation (Huron), 77.
Copper kettles, 82, 93, 94, 97, 98.
Copper, native, hammered, 97.
Coulson ridge sites, 90.
Creation myths, 126.
Crosses, double barred, 61, 99.
Customs, odd, Zulu, 147.
Dances, old time, directions for, 119.
Daniel (Father) place of his death, 67.
Decoration on clay pots, 112.
Desirability of preserving mounds and earthworks, 35.
Doppies, Zulu, 146.
Double-barred crosses, 61, 99.
Ducreux's map locations, 62, 64, 86, 87, 88.
Drunkenness forbidden, 121.
Dwellings, Indian, on high ground, 40.
Earth personified, 127.
Earthwork in Moore Township, 32.
Earthworks (complete) absence of in Medonte, 67.
Eclipses, attempts to destroy the sun, 127.
Evolution of pottery decoration, 112.
Feasts, importance of, 121.
Female dress, Zulu, 136, 138.
Femur, fractured– healed, 23.
Fiddle playing prohibited, 121.
Finery in dances, 146.
Finger nail decorations on pottery, 115.
Fire-stones and hearth-stones, 40.
Fish found in Burgess Lake, 37.
Fish-weir near Drumbo, 35.
Folk-lore definitions, 125.
Folk-lore, its use, 129.
Folk-lore traditional, 128.
Folk-lore, mythical, 127.
Folk-lore, three divisions, 125.
Four, a significant Indian number, 119.
Four beings or angels, The, 119-120.
French embankment, 108.
Gambling permitted at feasts and elsewhere, 121.
Gambling with cards forbidden, 121.
Gentlemen of South Africa, 139.
Goats (African), 149.
God, not necessarily the same for white men as for Indians, 124.
Gloucester trail, 70, 87.
Graves, Zulu, 146.
Great Spirit, adoption of the idea of, 118.
Great Spirit sleeps in afternoon, 119.
Hair, modes of wearing, Zulu, 146.
Heavenly bodies personified, 127.
Heavenly bodies deified, 127.
Hell, none in Indian paganism, 123.
Hematite paint, 78.
Hiawatha or Ayontwatha, 118.
Hiawatha of uncertain date, 118.
Human figure, carved bone, 80.
Human remains, burnt, 29.
Huron dwelling-places near springs, 58.
Hurons' favored dwelling-places on hills, 66.
Huron, Four Nations, Attignaouentans, Ataronchronons, Attignenonghacs and Arendaronons, 63.
Huron-Iroquois migration, 115, 116.
Huron-Iroquois origin, 115.
Huron totems, 63-64.
Huron villages populous, 66.
Ihonatiria, situation of, 67, 68.
Implements, Zulu, 141.
Indians become Europeanized slowly, 124.
Indian corn carbonized, 72.
Indian fairies, 117.
Indians not ostentatiously pagan, 117.
Innumerable spirits in Indian belief, 124.
Iroquois paganism, 115.
Kinghorn pit, 80.

Kinghorn mound, 82.
Kitchen, Dutch, 136.
Kraals and their structure, 140.
Localities of tribes, 139.
Lorraine crosses, 61.
Main trail, 69.
Matchedash Bay lowered in level, 60.
Maps, variations in early, 61.
Martin's (Father) good judgment respecting sites of villages, 68
Mealies, 137.
Mealing stones, 102.
Mealing stones, Zulu, 144.
Meaning of song and speech words in many cases lost, 125.
Medonte beaver marshes, 62.
Medonte, its situation and shape, 57.
Medonte, sturgeon in, 62.
Mental attitude necessary to distinguish Folk-lore phases, 126.
Metal relics plentiful in some places, 67, 73, 79.
Midden heaps in York, 45.
Midden or refuse-heaps, 79.
Migration of the Huron-Iroquois, 115.
Mississippi clay vessel, 19.
Moocha, the. 136.
Moon, new, February ceremonies. 122
Moore earthwork probably palisaded, 34.
Moore earthwork, no ash beds, 34.
Moore earthwork, no house sites, 35.
Moulded clay bead, 101
Mound, Yellow Point, 25.
Mounds, age of, 30.
Mounds and earthworks, desirability of their preservation, 35.
Mounds on low ground, 24.
Mounds on main water-routes, 32,
Mounds in Niagara Peninsula, 24.
Mounds, theory as to origin. 30-31.
Mounds, who made them, 30.
Myth-makers, the greatest, 131.
Myth-makers, gropers after truth, 127.
Negro police officers, 138.
Necklaces, 145.
Niyoh or Rawen Niyoh the Creator, 119 *et seq.*
Natural origin of Pagan worship, 117.
No knowledge of dyeing, 146.
Ojibwa land surrender (1798) 60.
Ojibwa trails, 69.
Oka Indians, 54.
Origin of Huron-Iroquois, 115.
Ong-we-ho-gon, 122.
Origin of Iroquois hostility to the French, 116.
Ornaments, Zulu, 141.
Ossuaries, 74, 75
Ossuaries, small around large one, 81.
Ossuaries in Niagara Peninsula, 24.
Owl, stone pipe. 103.
Pagan dress at dances, 117.
Palisaded villages, 66.
Phallocrypts, Zulu, 146.
Philosophy of folk-lore, 131.
Pictures on bark, 43.
Pits, shallow, with human bones, 81.
Pits, shallow, near village sites, 72, 76.
Pottery, found in graves, 111.
Pottery, Ojibwa (recent), 20.
Pottery decoration, 112.
Pottery decoration, no curves, 114.
Pottery, round bottomed, 109.
Prayer, oral, 120.
Proportion of Pagans among Iroquois, 116.
Proverbial, folk-lore, 128.
Punishment and retaliation, difference between, 123.
Raised beaches, 57.
Rattle snake, importance of, 117.
Raven-stone pipe, 104, 105.
Reasoning and thinking, 126.
Red Kaffirs, 137.
Relics in Yellow Point Mound, 28.
Relics, abundant around Lakeside, 40.
Rodents, 49
Ruminantia, 50.
Salutes, Zulu, 148.
Ste. Elizabeth missson, (Algonkin,) 65.
St. Ignace, situation of, 86, 89.
St. Joseph, (II,) 67, 69, 78.
St. Marie, Wye, 59, 89.
Scanonaenrat, situation of, 68.
Ska-ne-o-dy-o, 118.
Single graves, 99.
Single graves and ossuaries, 71.
Shells found on village sites in York, 45, 46, 47.
Sir William Johnson, 52, 54.
Skulls, Clinton Township, Lincoln, 22-23.
Slight changes in Indian paganism, 125.
Small ossuaries around large one, 81.
Smoking, Zulu, 147.
Snuff, use among Zulus, 145.
Sun and star worship, 128.
Sun dance, Cayuga, 120
Sun represented by the Great White Wolf, 117, 123.
Souls, three, 118.
Sources of error in tradition, 128.
Stakes, in rows, in Burgess Lake, 37.
Stone pipe, Bracondale, 19.
String, impressions on pottery, 114.
Sub-tropical marine shells, 95 97, 98.
Swazis, 137.
Taenhatentaron, 89.
Ta-ron-ya-wa-gon, 122.
Teanaustaye, 89.
Thinking and reasoning. 126.
Thunderers, the. 120.
Tobacco offerings at certain places, 118.
Tools employed in pottery decoration, 113, 114, 115.
Totemism and individualism, 122.
Tradition, sources of error in, 128.

Trails on ridges, 68.
Universal brotherhood, 130.
Vasey Ridge trail, 70, 73.
Vertebrates on village sites in York, 47, 48, 49.
Victoria Harbor trail, 70.
Village and camp-sights in Nissouri, 38.
Village names probably signifying "Lake," 74.
Village sites in Medonte, 65.
Village sites in York, 44.
Wampum belts, 52.
Wampum, large quantities of, 80, 81, 97.
Weapons, Zulu, 141.
White dog, burning of, 120, 122, 123.
White men, none go to Indian Heaven 124.
Wolf, White, substitute for the Sun, 117, 123.
Wooden pillows, Zulu, 144.
Yellow Point mound, 25.
Zulus as miners, 137.
Zulu food, 133.
Zulus, high standard of morality, 133.
Zulu ornaments, 136.
Zulu Songs, addressed to work, 132.
Zulus, short lived as laborers, 132.
Zulu, witch doctors, 132, 138.

UNIVERSITY OF TORONTO.

AUDITOR'S REPORT

TO THE

BOARD OF TRUSTEES

on

CAPITAL AND INCOME ACCOUNTS

FOR THE

YEAR ENDING 30TH JUNE, 1901.

ADOPTED 9TH NOVEMBER, 1901.

TORONTO:
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TORONTO.

AUDITOR'S REPORT

TO THE BOARD OF TRUSTEES ON CAPITAL AND INCOME ACCOUNTS FOR THE

YEAR ENDING 30TH JUNE, 1901.

Adopted 9th November, 1901

TORONTO, 30th October, 1901.

To the Trustees of the University of Toronto:

GENTLEMEN,—I have the honor to present the financial statement for the year ending 30th of June, 1901, following the lines of previous annual returns.

The recent University Act came into force on the 18th of April last, when a statement of your trust was prepared in which the results of the current year's revenue account were estimated. In the statement now submitted the actual revenue returns for the year appear. Included as revenue for 1900-1901 are two receipts of an exceptional character. One, an addition to the capital value of the College block on King St., Toronto, of ..... $ 8,077 85

The other, arrearages upon the taking back by the trust of land sold many years ago 3,418 00

$11,495 85

Treating these as revenue, the surplus was 1,645 48

Apart from them, the deficit was ..... $ 9,850 37

The investments appearing in schedule No. 9, protected by a contingent fund of $18 065.92 represent present values. The valuation of the lands and buildings are those made in 1892, the adjustment of which falls to be made, under the rule adopted by the late Board, on 30th June, 1902.

W. H. CROSS,
Auditor.

APPENDIX I.

BALANCE SHEET 30TH JUNE, 1901.

Funds.

General Endowments Fund,	Schedule 1	$3,497,945 29	
Specific Endowment Funds,	" 2	80,680 33	
Retirement Fund,	" 3	55 370 13	
Trust Funds,	" 4	19,816 25	
Revenue Reservations	" 5	10 568 63	
			$3,664,380 63

Assets.

Site lands, buildings and contents,	Schedule 6	$1.468,506 43	
Unproductive lands,	" 7	1,034.795 13	
Leased property,	" 8	479 837 09	
Investments,	" 9	678,809 54	
Past due fees,	" 10	2,432 44	
			$3,664.380 63

SCHEDULE I.

General Endowments Fund

Value of additions to Library during year 1900-1901, as shown by accession catalogue		$ 3,968 90
Less ratio of three per cent. depreciation for the year, upon $125,842 23		3,775 26
Addition to the fund for the year		193 64
Fund of 30th June, 1900		3,497.751 65
Fund of 30th June, 1901		$3,497 945 29

SCHEDULE 2.

Specific Endowment Funds.

Scholarships.

Blake, Matriculation	$22 236 99	
Blake. Science and Moderns	3,750 00	
Moss, Classics	2 000 00	
William Mulock, Classics and Mathematics	2,000 00	
Daniel Wilson, Natural Science	2,000 00	
George Brown, Modern Languages	1,128 34	
George Brown, Medical Science	5,391 72	
Clark, Medical Psychology	40 00	
Mary Mulock, Classics	2,778 74	
Goldwin Smith, Classics	50 00	
William Ramsay, Political Economy	1,009 42	
Julius Rossin, German	1,000 00	
Bankers, Political Science	1,200 00	
John Macdonald, Philosophy	2 030 00	
Physics	2,350 00	
Prince of Wales Prize, General Proficiency	950 00	
Mackenzie Memorial	17,834 60	
Fulton Bequest	3,291 30	
Starr Bequest	4,655 23	
Stewart Bequest	1,378 50	
Lyle Medal	174 97	
Young Memorial	3,230 52	
Gibson, Matriculation	200 00	
		$80,680 33
Return of 30th June, 1900	79,307 97	
Interest appropriation	3 902 36	
Rent Starr Farm	120 00	
Gibson, Matriculation	100 00	
Goldwin Smith Scholarship	50 00	
Dr. Clark Scholarship	40 00	
	$83,520 33	
Scholarship expenditures	2,840 00	
		$80,680 33

In addition to the above, $60 was received as the Dale Scholarship in Classics, the amount having been expended during the year.

SCHEDULE 3.

Retirement Fund.

Beneficiaries, 30th June, 1901.

James Loudon	$6,328 04	
Alfred Baker	3,703 94	
Maurice Hutton	3,703 94	
R. Ramsay Wright	3,703 94	
W. J. Alexander	3 703 94	
J. G. Hume	3,457 26	
J. F. McCurdy	2,849 36	
James Mavor	2,617 67	
G. M. Wrong	2,037 68	
J. E. Berkeley Smith	1,840 13	
A. B. McCallum	1,805 93	
W. H. Fraser	1,805 93	
John Squair	1,805 93	
John Fletcher	1,440 92	
W. J. Loudon	1,393 38	
D. R. Keys	1,393 38	
H. H. Langton	1,220 99	
W. S. Milner	935 09	
J. H. Cameron	935 09	
G. H. Needler	935 09	
W. Lash Miller	934 87	
August Kirschmann	884 94	
A. T. DeLury	795 74	
C. A. Chant	795 74	
E. C. Jeffrey	795 74	
James Brebner	787 13	
Adam Carruthers	775 31	
J. C. McLennan	513 04	
R. G. Murison	342 67	
G. W. Johnston	342 67	
R. R. Bensley	293 54	
P. Toews	233 67	
W R. Lang	182 70	
F. B. Kenrick	37 87	
F. B. Allan	37 87	
		$55,370 13
Fund of 30th June, 1900	$46,982 57	
Interest as per terms of Order in Council	2.941 96	
Contributions 1900-1901	5,445 60	
Fund of 30th June 1901		$55 370 13

SCHEDULE 4.

Trust Accounts.

Residence Extension Fund	$ 932 44	
Hon. Wm Mulock	626 00	
Library Funds :		
Insurance	$19,940 31	
German	1 60	
French	5 00	
Greek	30 00	
Medical	300 00	
	17,276 91	

Medical Faculty Funds :			
Gynaecological	$ 50 00		
Materia Medica	57 56		
Obstetrical	500 00		
		607 56	
Museum donations		83 36	
Biological students supply		58 54	
Langton memorial		30 00	
Local lectures fund		201 44	
			$19,816 25
Return of 30th June, 1900		$24,416 97	
Interest appropriations		665 26	
Receipts during 1900-1901		1,585 00	
		$26 667 23	
Library expenditures	$4,342 77		
Other expenditures	2,508 21		
		6,850 98	
			$19,816 25

SCHEDULE 5*a*.

Revenue Reservations.

Accrued income 30th June, 1896		$29,179 41	
Deficits shown on 30th June, 1900		31,567 24	
		$2,387 83	
Balance of revenue 1900-1901 account		1 645 48	
(Deficit 30th June, 1901)			$ 742 35

Suspense Account.

Unpaid portion of outlays upon granolithic walks in the grounds		$1,072 00	
Advances upon dining hall		2.213 19	
Fire insurance premiums paid in advance		3,469 75	
			$6,754 94
			$7.497 29

Contingent Fund.

Amount 30th June, 1900		$15,466 58	
Final dividend from estate of D. Campbell		38 03	
Indian Road property :			
Difference between amount of sale	$10,000 00		
And face amount of original investment.	7,421 60		
		2,578 40	
		$18,083 01	
Less—			
Crawford Street land :			
Difference between face amount of original investment $717.09 and amount realized $700.00		$17 09	
			$18,065 92
			$10,568 63

SCHEDULE 5*b*.

Income Accrued but Not Due.

Accounts.	30th June, 1900.	30th June, 1901.
Debentures	$4 982 10	$5,196 33
Mortgages	6,359 40	5,838 28
Park rentals	4,663 75	4,413 75
School of Science	154 58	154 58
Business rentals	778 84	778 84
City of Toronto	1,500 00	1,500 00
Interest from land sales	58 18	64 93
	$18,496 85	$17.946 71
Agricultural fees	421 46	123 94
School of Practical Science	.....	2,066 00
Other fees	57 00	34 00
	$18,975 31	$20,170 65

SCHEDULE 5*c*.

Revenue 1900-1901.

Outlay.

Appropriations as per page 23 of printed report of the standing Committee on Finance, dated March 1901	$140,587 53	
Interest on special trust funds	7 528 85	
	$148,116 38	
Supplementary appropriations	660 14	
	148,776 52	
Less.		
Unused of original appropriations	577 61	
		$148,198 91

Income.

Account.	Estimate.	Actual.	
Interest:			
On purchase moneys	407 15	3,823 30	
On loans	19,702 14	19 306 40	
On debentures	10,501 38	10 679 99	
On advance to U. C. College	8,077 85	8,077 85	
On bank balances	300 00	320 53	
Rents:			
University Park	11,050 50	11,732 44	
Business properties	3,475 00	3,326 70	
School of Science	925 00	925 00	
Medical Faculty	1,900 00	1,900 00	
Board of Health	200 00	200 00	
City of Toronto payment	6,000 00	6,000 00	
Legislative Grant, general	7,000 00	7,000 00	
do specific	25,281 00	25,281 00	
Crown Lands sold	2,500 00	2,708 14	
Sundry earnings, land	2,450 00	2,450 83	
Gymnasium fees	1,000 00	1,097 48	
University and College fees	45,000 00	45,614 73	
	$145,770 02		149,844 39
Surplus 1900-1901 ordinary account			1,645 48

Note :

Estimated deficit as per page 23 of above named report	27,627 36	
Deduct departmental grant by Legislature.	25,281 00	
Deficit as per estimates	2,346 36	
Unestimated receipts of arrears of interest for past years on a cancelled land sale; treated above as an ordinary receipt	3,418 00	
A surplus of	1,071 64	
Income otherwise in excess of estimate	656 37	
	1,728 01	
Outlay in excess of estimates	82 53	
		$1,645 48

SCHEDULE 5*d*.

Revenue Expenditures 1900-1901.

Service.	Original Appropriation.	Supplementary Appropriation.	Unused.
Salaries	$100,717 00	.....	$15 93
Pensions	2,800 00	.....	.....
Examiners	3,195 00	77 53	.....
Convocation expenses	250 00	126 50	.....
President's office	325 00	.....	15 15
Bursar's office	750 00	.....	3 41
Registrar's office	50 00	.....	.....
Stationery, University	900 00	133 82	.....
" University College	75 00	9 00	.....
Printing, University	2,600 00	124 94	.....
" University College	75 00	.....	23 65
Advertising, University	200 00	.....	7 97
" University College	100 00	.....	4 85
Incidentals, University	175 00	.....	1 65
" University College	50 00	.....	4 49
" General	400 00	41 05	.....
Law costs	700 00	106 64	.....
Interest on trust funds	7,528 85	.....	19 27
Insurance	1,800 00	.....	.....
Telephones	200 00	.....	11 26
Grounds	3,350 00	.....	21 60
Main building	5,475 00	20 71	.....
Library building	875 00	.....	51 64
Biological building	2,756 53	.....	54 16
Chemical building	1,632 00	4 36	.....
Gymnasium building	1,050 00	.....	141 47
Library proper	2,600 00	.....	.....
Biological students' supplies	612 00	.....	.....
Biological department	1,900 00	.....	18 41
Chemical "	1,000 00	.....	55 61
Mineralogical "	200 00	.....	2 20
Physiological "	1,200 00	.....	18
Physical "	1,800 00	.....	77 39

SCHEDULE 5*d*.—*Con.*

Service.	Original Appropriation.	Supplementary Appropriation.	Unused.
Philosophical "	$500 00	$15 59	.....
Political Science department	25 00	.....	.....
Classical "	30 00	.....	13 50
English "	100 00	.....	.....
French "	20 00	.....	.....
German "	40 00	.....	22 25
Italian and Spanish "	15 00	.....	45
Oriental "	25 00	.....	.....
History "	20 00	.....	11 12
Original appropriations	$148,116 38		
Supplementary appropriations		$660 14	
Unused of appropriations			$577 61

SCHEDULE 6.

SITE LANDS, BUILDINGS AND CONTENTS.

30th June, 1901.

Lands set apart for the use of the University	$475,361 40	
Main building and residence	450,000 00	
Museum building	73,085 42	
Biological building	56,659 88	
Library building	110 015 65	
Chemical building	77,469 88	
Gymnasium building	36,288 46	
Y. M. C. A. Hall	1 00	
South Lodge	1,000 00	
		$1,279.881 69
Library proper	$122 066 97	
Museum proper, fittings and biological apparatus	24,691 02	
Chemical apparatus	9,975 90	
Mineralogical and Geological apparatus	8,212 16	
Physical apparatus	15,900 00	
Psychological apparatus	1.800 00	
Mathematical apparatus	600 00	
		183,246 05
Main building furniture	$3,841 20	
Residence furniture	1,537 49	
		$5,378 69
		$1,468,506 43
Return of 30th June, 1900	$1,468 337 79	
Additions to Library during year	3,968 90	
	$1,472 306 69	
Yearly allowance for depreciation of Library	$3,775 26	
Proceeds of sale of portion of residence chattels	25 00	
	3,800 26	
		$1,468,506 43

SCHEDULE 7.

Unproductive Lands.

Hoskin Avenue and Devonshire Place survey	$176,356 70	
Block between North Drive and Devonshire Place	217,657 53	
Block East of North Drive	86,751 50	
Lots numbered 51, 52, 54, 69, 70 and 71	91 273 50	
Lots on College Avenue, Nos 3, 6, 8 and 9	36 864 00	
Lots in Port Hope	7,100 00	
Lots near Belleville	1,790 00	
Farm lands	152 00	
College block, King Street, Toronto	416,850 40	
		$1,034,795 13
Return of 30th June, 1900	$1,021,957 31	
Adelaide Street, asphalt pavement, final payment	1,278 66	
Interest upon advances upon U. C. College block	8,077 85	
Transfer, from unpaid purchase money, of sale on Devonshire Place	12,020 00	
	$1,043 333 82	

Less.

Indian Road property sold for $10,000	$7,421 60		
Crawford Street lot sold for $700	717 09		
Material of U. C. College building sold	400 00		
		8,538 69	
			$1 034 795 13

SCHEDULE 8.

Leased Lands.

Victoria College site	$1 00	
Wycliffe College site	2,500 00	
Observatory site	1 00	
School of Science site	18,500 00	
Land leased to City of Toronto	120,000 00	
Park lands	192,205 00	
Toronto business properties	78,038 10	
Caradoc farm	2,000 00	
Cavan farm	4,500 00	
Valuation of lands		$417,745 10
St. George Street house and land	$8,031 85	
Cumberland house and land	14,842 75	
Pembroke Street house and land	4,778 39	
Park Hospital building	24,982 16	
		52 635 15
Wycliffe College pavement		1,302 40
Park and business ground rents :—		
Past due	$1,307 27	
Accrued but not due, park rentals	4,413 75	
City of Toronto payment	1,500 00	
School of Science accrued	154 58	
Business ground rents, accrued but not due	778 84	
		8 154 44
		$479,837 09
Return of 30th June, 1900	$461,824 52	

Transfers from investments :—		
Farm in township of Cavan	4,500 00	
Business property, Church St., Toronto	8,438 10	
Dwelling house on Pembroke Street	4 347 44	
Outlay upon Pembroke Street property	430 95	
Interest on Wycliffe College pavement advance	46 06	
Increased revenue outstanding	250 02	
		$479.837 09

SCHEDULE 9.

Investments 30th June, 1901.

Debentures and Municipal bonds	$287,906 82	
Interest past due	1.718 26	
Interest accrued but not due	5,196 33	
		$294,821 41
Loans secured by mortgages upon real property	351,764 35	
Advanced as premium on fire policies	136 22	
Interest past due	1,869 32	
Interest accrued but not due	5,838 28	
		359,608 17
Unpaid purchase money on land sales	11,495 84	
Interest past due	93 00	
Interest accrued but not due	64 93	
Earnings past due	142 50	
		11,796 27
Canadian Bank of Commerce, on deposit		12,583 69
		$678,809 54

1900-1901 Transactions.

Inwards.

Debentures paid off	$ 14,965 88	
Loans repaid	39,342 54	
Purchase money payments	1,411 90	
Sale cancelled, $12,820, upon payment of interest, $3,418, and principal, $800	12,020 00	
Decreased revenue outstanding	306 74	
Withdrawals from Canadian Bank of Commerce	196,872 95	
		$264,920 01

Outwards.

Debentures purchaesd	$ 37 205 51	
Mortgage re-investment	5,092 43	
Indian Road sale after payment of $3,000	7 000 00	
Crawford Street land sold	700 00	
Deposited in Canadian Bank of Commerce	186,041 78	
		236 039 72
Decrease during the year in volume		$28,880 29
Return of 30th June, 1900		707,689 83
Return of 30th June, 1901		$678,809 54

SCHEDULE 10.

Fees.

Actual Receipts during 1900-1		$44,160 75
Deduct arrears of 30th June, 1900, all collected and included therein	$ 478 46	
Balance of burglary loss carried over from last year, now written off by direction of Trustees	500 00	
		978 46
		$43,182 29
Add arrears of 30th June, 1901		2,432 44
Fees of 1900 1901		$45 614 73

Arrears of 30th June, 1901 :

Agricultural arrears on 30th June, 1900	$ 421 46	
Examination outlay, 1900-1	117 48	
1 Degree	10 00	
	$ 548 94	
Received from Department of Agriculture	425 00	
		$ 123 94
1 Registration fee		18 00
5 Library fees		10 00
1 Dispensation fee		5 00
Part of 1 Examination fee		1 00

School of Practical Science fees :

Due for instruction	$2,066 00	
" Physical Laboratory supplies	208 50	
		2,274 50
		$2,432 44

APPENDIX 2.

Fees Received 1900 1901.

Faculty of Arts.

Subject.	1st Year.	2nd Year.	3rd Year.	4th Year.	Miscellaneous.
	$ c.	$ c.	$ c.	$ c.	$ c.
College fees	4,769 00	4,263 00	3,316 50	3,288 00	197 00
Penalties	29 00	47 00	40 00	33 00	
Dispensations	10 00	80 00	120 00	50 00	
Honor Certificates			1 00		72 00
Matriculation	17 00				419 00
Ad Eundem	10 00	10 00	30 00	20 00	10 00
Examination	2,535 00	3,162 00	2,254 00	1 952 00	969 00
Degrees				1,120 00	530 00
Chemical supply	22 00	94 00	70 00	44 00	3 00
Mineralogical supply		21 50	10 00	28 00	
Biological "	52 00	60 00	30 00	145 00	20 00
Physical "	31 00	22 00	161 00	60 00	2 00
Psychological "			25 00	59 00	5 00
Library	372 00	356 00	274 00	236 00	14 00
Medical Students:					
Matriculation	20 00	25 00	10 00	17 00	5 00
Ad Eundem	10 00	30 00	10 00		20 00
Honor Certificate					2 00
Examination	1,110 00	1,107 00	530 00	510 00	200 00
Degrees				980 00	120 00
Chemical supply	342 00	288 00			
Biological "	172 50	265 25			
Instruction to Medical Faculty in Arts Subjects	1,568 00	1,440 00			
Instruction to Practical Science Students					
Totals	11,069 50	11,270 75	6,882 50	8,542 00	2,588 00

APPENDIX 2.—*Continued.*

Departmental Fees.

Subject.	Law.	Dentistry.	Engineering and Applied Science.	Music.	Pharmacy.	Pedagogy.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Matriculation	80 00	120 00			280 00	
Examination	150 00	436 00	200 00	50 00	570 00	20 00
Practical examination					114 00	
Degrees	140 00	353 00	260 00		570 00	40 00
Totals	370 00	909 00	460 00	50 00	1,534 00	60 00

Classification of Fees Paid.

First year	$11,069 50	
Second year	11,270 75	
Third year	6,882 50	
Fourth year	8,542 00	
Miscellaneous	2,588 00	
Law	370 00	
Dentistry	909 00	
Engineering	460 00	
Music	50 00	
Pharmacy	1,534 00	
Agricultural	425 00	
Pedagogy	60 00	
		$44,160 75

Classification of Services.

College fees	$15,833 50
Penalties	149 00
Dispensations	260 00
Honor Certificates	75 00
Matriculation	993 00
Ad Eundem	150 00
Examination	15,755 00
Practical Examination	114 00
Degrees	4 113 00
Chemical supply	863 00
Mineralogical supply	59 50
Biological "	744 75
Physical "	276 00
Psychological "	90 00
Library	1,252 00
Instruction to Medical Faculty Arts Subjects	3,008 00
" Practical Science Students	
Agriculture, payment by Government	425 00
	$ 44 160 75

APPENDIX 3.

Medical Faculty Fees.

First year	$11,514 00		
Less Arts portion	1,568 00		
		$9,946 00	
Second year	$10,012 00		
Less Arts portion	1,440 00		
		8,572 00	
Third year		5,763 00	
Fourth year		5,277 00	
Miscellaneous fees		825 00	
Registration fees		625 00	
Psychological fees (collected for Dr. Daniel Clark)		255 00	
Interest on bank account		276 39	
Advanced by Trustees of University for equipping the Department of Pathology		3,200 00	
Receipts during 1900-1			$34.739 39

Contra.

Salaries :			
Professors and Associate Professors	$16,408 60		
Lecturers and Instructors	932 40		
Demonstrators and Asst. Demonstrators	1,805 60		
Secretary and Assistant	600 00		
		$19 746 60	
Honorarium to Dr. Richardson		250 00	
Psychological fees paid over to Dr. Clark		255 00	
Wages of attendants		1,551 00	
Rentals :			
Biological building	$1,900 00		
Gerrard street building	1,000 00		
		2,900 00	
Interest on University advance from 15th May, 4% on $3,200 (Repayment of advance to be made in four annual instalments of $800.)		18 25	
Working expenses		6,818 56	
University advance expended on equipment for Pathology		3,200 00	
			$34.739 39

Arrears on 30th June, 1900		$315 00
2 third year fees collected and included in above	$210 00	
1 third year fee written off	105 00	
		$315 00

No arrears 30th June, 1901.

TWENTY-SEVENTH ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM

1901.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:

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1902.

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TORONTO.

CONTENTS.

PART I.

REPORT OF THE PRESIDENT vii

Alterations and additions, vii—New Buildings, vii—Benefactors of the College and the People of Canada, vii—Short Special Courses, viii—Attendance, viii—Age and Religion of Students, ix—Analysis of College Roll, ix—County students, ix—Changes in Staff, x—English, with a reference to some recent Criticisms, x—Physics, xii—Biology, xii—Veterinary Science, xii—Chemistry, xii—Dairy Department, xiii—Farm and Feeding, xiv—Inter-collegiate Stock Judging Competition in 1901, xiv—Horticulture, xv—Bacteriology, xv—Field Experiments at the College, xvi—Co-operative Experiments, xvi—Poultry Raising, xvi—Bee-keeping, xvii—Military and Gymnastic Drill, xvii—Excursions, xvii—Class Room Work, xviii—Examinations, xv ii—Financial Statement, xxi.

PART II.

REPORT OF THE PROFESSOR OF PHYSICS 1

English, 1—Physics, 1—Investigations Undertaken, 1—Destruction by Lightning in Ontario, 2—Cold Storage, 6—Fruit in Cold Storage, 11—Ventilation of Farm Stables, 11—Rainfall and Temperatures, .

PART III.

REPORT OF PROFESSOR OF BIOLOGY AND GEOLOGY 16

Needs of Biological Department, 16—Class Rooms and Laboratory Instruction, 16—Outside Work, 17—Bulletins, Reports and Articles Published, 18—Injurious Insects and Fungous Diseases, 18.

PART IV.

REPORT OF THE ASSOCIATE PROFESSOR OF BIOLOGY 26

Class Room, 26—Report on Mustard Spraying, 26—The Herbarium and Systematic Botany, 29—Bird Notes, 31.

PART V.

REPORT OF THE PROFESSOR OF CHEMISTRY 35

Outside Work, 35—Work with Poultry Department, 36—Work with Experimental Department, 37—Work with the Dairy and Bacteriological Departments, 37—Sugar Beets, 38.

PART VI.

REPORT OF THE PROFESSOR OF VETERINARY SCIENCE 42

Class Room, 42—Diseases and Ailments of the Stock, 43.

PART VII.

REPORT OF THE PROFESSOR OF DAIRYING 44

The Dairy School, 44—Care of Milk for Cheese-making, 45—Variations in Methods of Making Cheddar Cheese, 46—Washing Curds, 46—Light *vs.* Dark Curing-rooms, 48—Curing Cheese in cold Storage, 48—Butter Cultures, 48,—Moisture and Salt in Butter, 49—Pasteurization of Milk at Different Temperatures, 51—Turnip Taint, 51—Columbia Air Churn, 51—Testing Cows, 51—Milk Supply for Experimental Purposes, 51—Export of Butter in Pound Prints, 53—Parchment Butter Paper, 53—Cold Storage, 53—Improvements Made and Needed, 54—Feeding Calves, 54—Dairy Herd, 54.

PART VIII.

REPORT OF PROFESSOR OF AGRICULTURE 56

Corn Silage *vs.* Roots for Steers, 56—Peas *vs.* Corn for Fattening Steers, 58—Influence

of Roots in Swine Feeding, 58—Experiments with Pure-bred Swine, 60—Farm Superintendence, 62—Crops, 63—Live Stock, 64—Financial Statement, 66.

PART IX.

REPORT OF THE PROFESSOR OF HORTICULTURE 67
Courses of Instruction, 67—Development of Department, 68—Teaching by Object Lessons, 68—Experimental Work, 68—Strawberries, 68—Raspberries, 69—Black Raspberries, 70—Currants, 70—Gooseberries, 71—Tomatoes, 71—Co-operative Experiments, 72—Fruit Exhibit at the Pan-American, 72—Inspection of Fruit Experiment Stations, 73—Meetings attended, 73.

PART X.

REPORT OF PROFESSOR OF BACTERIOLOGY 74
Lectures, 74—Publications, Personal Visits, etc., 74—Investigating Disease Among Poultry, 74—Laboratory Work, 76—Assistance Offered to Creameries and Cheese Factories, 77—Defects in Cheese, 77—Defects in Butter, 78—Samples of Water for Analysis, 79—Cultures, 80—Alkaline Solution, 80—Assistance Offered to Veterinarians and Farmers, 80.

PART XI.

REPORT OF EXPERIMENTALIST 82
Agriculture in Europe, 82—Field Experiments at the O. A. C., 82—Seed Grain Selections, 84—Continuous Selection of Seed Oats, 85—Grain grown in Mixtures, 85—Cultivating and Plowing Root, Potato, Rape and Corn ground, 86—Cultivation for Oats and Barley, 86—Varieties of Oats, 86—Seed Oats from different Latitudes, 87—Barley, 87—Spring Wheat, 88—Varieties of Winter Wheat, 88—Rye, 89,—Buckwheat, 90,—Field Peas, 90—Weevil Proof Peas, 91—Field Beans, 92—Soy, Soja, or Japanese Beans, 92—Vetches for Seed, 93—Flax, 93—Millet for Seed, 93—Corn for Grain, 93—Sorghum for seed, 94—Sunflower for Seed, 94—Potatoes, 94—Number of Potato sets to plant in each hill, 95—Length of time to cut Potatoes before planting, 95—Remedies for Potato beetle, 95—Field Roots, 96—Selection of Root Seed, 96—Planting Root Seed at different depths, 97—Roots grown on flat and on ridges, 97—Thinning Plants of Field Roots, 97—Varieties of Sugar Beets for Agricultural purposes, 97—Fodder Corn, 99—Different mixtures of Peas and Oats for Green Fodder, 99—Sorghum for Green Fodder, 100—Kohl Rabi, 101—Rape, 101—Vetches, 102—Leguminous, Crops for Green Fodder, 103—Millet for Green Fodder and for Hay, 104—Grasses, 105—Clovers, 105—Grasses and Clovers, 106—Grasses and Clovers sown in Fall and Spring, 106—Mixture of Hardy Grasses and Clovers for the production of either Hay or Pasture, 108—Annual Crops for Pasture, 109.

PART XII.

REPORT OF MANAGER OF POULTRY DEPARTMENT 112
Egg Production, 112—Cost of Producing Summer Eggs, 114—Brooder House, 113—Breeding Pen House, 115—Colony House, 114—Fattening House, 115—Hatching Season, 117—Incubating and Breeding, 119—Ducks, 119—Fattening Chickens, 119.

PART XIII.

REPORT OF THE LECTURER ON APICULTURE 126
Controlling Fertilization of Queen's, 126—Utilization of Partially Filled Sections, 126.

PART XIV.

REPORT OF THE PHYSICIAN 127

TWENTY-SEVENTH ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM

FOR THE YEAR 1901.

GUELPH, December 31st, 1901.

To the Honorable JOHN DRYDEN,
Minister of Agriculture:

SIR,—I have the honor to transmit herewith the Twenty-seventh Annual Report of the Ontario Agricultural College and Experimental Farm.

In this Report the work of the year 1901 has been briefly reviewed under the following heads:

PART I. REPORT OF PRESIDENT.
PART II. REPORT OF PROFESSOR OF PHYSICS AND LECTURER IN ENGLISH.
PART III. REPORT OF PROFESSOR OF BIOLOGY AND GEOLOGY.
PART IV. REPORT OF ASSOCIATE PROFESSOR OF BIOLOGY.
PART V. REPORT OF PROFESSOR OF CHEMISTRY.
PART VI. REPORT OF PROFESSOR OF VETERINARY SCIENCE.
PART VII. REPORT OF PROFESSOR OF DAIRYING.
PART VIII. REPORT OF PROFESSOR OF AGRICULTURE AND FARM SUPERINTENDENT.
PART IX. REPORT OF PROFESSOR OF HORTICULTURE.
PART X. REPORT OF PROFESSOR OF BACTERIOLOGY.
PART XI. REPORT OF EXPERIMENTALIST.
PART XII. REPORT OF MANAGER OF POULTRY DEPARTMENT.
PART XIII. REPORT OF LECTURER ON APICULTURE.
PART XIV. REPORT OF THE PHYSICIAN.

I have the honor to be, Sir,

Your obedient servant,

JAMES MILLS,
President.

THE ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM

GUELPH, ONTARIO.

HON. MR. DRYDEN, Minister of Agriculture,
Toronto, Ont.

STAFF IN 1901.

JAMES MILLS, M.A., LL.D. ..... President
H. H. DEAN, B.S.A. ..... Professor of Dairy Husbandry
J. HUGO REED, V.S. ..... Professor of Veterinary Science
J. B. REYNOLDS, B.A. ..... Professor of Physics and Lecturer in English
C. A. ZAVITZ, B.S.A. ..... Director of Field Experiments (College and Co-operative)
Wm. LOCHHEAD, B.A., M.S. ..... Professor of Biology and Geology
G. E. DAY, B.S.A. ..... Professor of Agriculture and Farm Superintendent
H. L. HUTT, B.S.A. ..... Professor of Horticulture
F. C. HARRISON, B.S.A , D.P.H. (who has charge of Library) ..... Professor of Bacteriology
R. HARCOURT, B.S.A. ..... Professor of Chemistry
M. W. DOHERTY, B S.A., M.S. ..... Associate Professor in Biology
W. P. GAMBLE, B.S.A. ..... Associate Professor of Chemistry
M. CUMMING, B.A., B.S.A. ..... Assistant in Agriculture
H. STREIT, D.M.V. ..... Assistant in Bacteriology
Miss ALICE ROWSOME, B.A. ..... Assistant in Library and Instructor in French and German
W. J. RUTHERFORD ..... Dean of Residence and Instructor in English and Mathematics
W. . GRAHAM, B.S.A. ..... Manager and Instructor in Poultry Department
H. R. ROWSOME ..... Lecturer on Apiculture
Captain W. CLARK ..... Instructor in Drill and Gymnastics
W. O. STEWART, M.D. ..... Physician
G. A. PUTNAM, B.S.A. ..... Secretary
A. MCCALLUM ..... Bursar

PART I.

REPORT OF THE PRESIDENT.

The past year has been one of marked activity and progress in the history of the Ontario Agricultural College and Experimental Farm,—alterations in buildings, new buildings, liberal donations by wealthy men, short special courses, and largely increased attendance of students.

Alterations and Additions

The gradual increase in the number of students applying for admission, made it necessary to increase the number of dormitories, either by the erection of a new building or by alterations in the residence which had served the purpose fairly well till about two years ago; and, the latter course having been decided upon, the south wing of the main College building, hitherto occupied by the library and museum, was changed into students' rooms—heated, lighted, furnished, and got ready for occupation by the 1st September. These alterations made provision for 49 additional students; and by the first of October there were applications for nearly every room, old and new.

These alterations involved also the change of a class-room into offices, and the construction of a college post office, with excellent boxes of the latest pattern, in one end of what has hitherto been the College Reading-Room.

In the Poultry Department also, we made extensive alterations and additions, to provide for the Special Short Course in Poultry Raising, commencing on the 10th January and continuing for four weeks. These alterations consisted chiefly of changes in and additions to the main building, giving us another office or common room, a new office for the manager, a judging room, and a wash room for men on the ground floor, with a sitting-room and lavatory for ladies and a commodious class-room on the first floor, all heated with hot water.

New Buildings.

Two new buildings were erected during the year, one by vote of the Legislature and the other by the Massey family of Toronto. The Provincial building is a large, plain structure of three stories, red pressed brick with Guelph limestone trimmings, intended to accommodate the physical and biological laboratories and the college museum; the other is a beautiful building of red pressed brick with foundation and trimmings of Credit Valley Brown Stone, providing a students' hall, a large reading room, a library for 75,000 volumes, a librarian's room, three seminary rooms, and five rooms for fellows and assistants,—heated, lighted, furnished, and all complete.

Benefactors of the College and the People of Canada

The winter of 1901 will be memorable in the annals of the College, and, we might say, of the Dominion; as then, for the first time in the history of the country, a man of means made a considerable contribution unconditionally to a public institution directly under the control of the Provincial Legislature—then the late and much lamented W. E. H. Massey, of Toronto, with generous liberality, supported by his brother, Chester D. Massey, and his sister, Mrs. Lillian Massey Treble, placed at the disposal of the Ontario Government the sum of $40,000 for the erection, heating, lighting, and furnishing of a College Hall and Library. This building to be known as "the Massey Hall and Library," is nearing completion and will be ready for occupation in June next. For a brief description, see the preceding paragragh.

This benefaction will be a lasting benefit to our Canadian farmers; and I am pleased to state that it has already drawn attention to the College and has raised it to a higher level in public estimation.

In the fall of the same year, 1901, another noteworthy event occurred. Sir William C. Macdonald, of Montreal, who has done such great things for McGill University by his magnificent gifts to the science department of that institution, and for the people of Canada by his large contributions for the establishment and temporary maintenance of Manual Training Schools in the different Provinces of the Dominion,—this liberal, broad-minded, and public spirited Canadian decided to give the Ontario Government $125,000 for the establishment of a Department of Domestic Science, Nature Study, and Manual Training in connection with the Ontario Agricultural College, to train Public School teachers from any part of the Dominion, and provide practical education for women, especially farmers' daughters. Surely these two events in the same year constitute an epoch in the history of the College; and as President I wish to express my heartfelt thanks to the Massey family, Sir William Macdonald, Prof J. W. Robertson, who has been acting for Sir William, and Mrs John Hoodless, of Hamilton, who judiciously impressed upon Sir William the importance of training our girls in Home Economics, or the science and art of housekeeping in its various branches and details.

Short Special Courses.

With some hesitation, we decided about midsummer to offer two short courses in the winter of 1902,—one in Live Stock and Grain Judging, to commence on the 8th January and last for two weeks; and another on Poultry Raising, to commence on the 10th January and last four weeks.

The experiment is now a thing of the past, and we have to report that both these courses were an unqualified—we might say—a triumphant success. Nothing better could be desired.

On account of the practical work required we were unable to handle more than 30 in addition to the regular students, in the Poultry Department; but we were not obliged to place any restriction on the number to be admitted for Stock Judging; and the result was that we had 220 in regular attendance—110 more than we could accommodate in our live stock class-room. Hence we had to divide the class and repeat the course.

The instruction in both courses was given by our regular professors, the Hon. John Dryden (Minister of Agriculture), and a few of the leading stockmen and poultrymen of the Province.

The classes were composed chiefly of young men, but there was a very fair proportion of men over fifty years of age, all anxious to learn—so anxious that they were at the College every day at eight o'clock for Mr. Zavitz's talks, with practice, in grain judging, or Prof. Lochhead's on weeds and weed seeds; from 9 a m to 5 p.m., excepting an hour and a half for lunch, with Prof. Day, Dr. Reed, Mr. Cumming, and others in judging horses, cattle, sheep, and swine; and from 7.30 to 9 30 p.m., listening to lectures in the class-room.

We hope to continue these short courses from year to year.

Students in Attendance.

The total number of students registered for work at the College in 1891, was 281 in the General course, 80 in the Dairy Course, and 22 Specialists, less two registered in both General and Dairy Courses,—making a net total of 381 in these two courses.

The three short courses (Stock Judging, Poultry Raising, and Domestic Science), numbering 344, added to the foregoing, would make a total of 725 who registered for work at the College within the twelve months ending February 15, 1902. The students in the short courses were nearly all from this Province; and of those in the General and Dairy Courses, including 22 Specialists, 295, or a little over 82 per cent (nearly all farmers' sons), were from Ontario, 29 from other provinces of the Dominion, and 35 from other countries.

The rooms in the College Residence are reserved, so far as they may be required, for Ontario Students in the General Course. Ontario Students in the General Course ordinarily pay $20 a year tuition fee. If nominated by County Councils, they are admitted free of tuition. Students from all places outside of the Province, pay $50 a year tuition fee.

Ages and Religious Denominations.

The limits of age and the average age of students in the General Course in 1901 were nearly the same as in 1900, 16 to 35 years; average 20 years.

The religious denominations were as follows: *General Course*,—92 Presbyterians, 80 Methodists, 44 Episcopalians, 22 Baptists, 20 Roman Catholics, 5 Disciples, 3 Congregationalists, 2 United Brethren, 2 Christadelphian, 2 Lutheran, 1 Mennonite, 1 Church of Christ, 1 Greek Orthodox, 1 Christian Association, 1 Friend, 1 Evangelical Association, 1 Plymouth Brethren, 1 New Jerusalem, 1 Free Thinker, 1 Christian Science. *Dairy Course*,—29 Methodists, 26 Presbyterians, 8 Baptists, 6 Episcopalians, 4 Roman Catholics, 3 United Brethren, 1 Mennonite, 1 Christian.

Analysis of College Roll (General Course).

1. From Ontario.

Brant	8	Kent	3	Pr. Edward	1
Bruce	5	Lambton	5	Rainy River	2
Carleton	6	Lanark	3	Renfrew	1
Dufferin	4	Leeds	4	Russell	2
Dundas	5	Lennox and Addington	3	Simcoe	11
Durham	2	Lincoln	5	Stormont	1
Elgin	8	Middlesex	6	Victoria	2
Essex	2	Norfolk	4	Waterloo	6
Frontenac	1	Ontario	5	Welland	4
Glengarry	2	Oxford	8	Wellington	18
Grenville	2	Parry Sound	2	Wentworth	10
Grey	8	Peel	1	York	16
Haldimand	1	Perth	7	Toronto	13
Halton	8	Peterborough	2		222
Hastings	3	Prescott	4		
Huron	8				

2. From other Provinces of the Dominion.

British Columbia	1	Nova Scotia	6	Assiniboia	3
Manitoba	4	Quebec	10		27
New Brunswick	3				

3. From other Countries.

England	7	United States	4	Sweden	1
Jamaica	3	Argentine Republic	14		32
Mauritius	1	Asia Minor	1		
Scotland	1				

Total in General Course 281
Total in General and Dairy Courses 359

It will be noticed that 43 Ontario counties and districts were represented by students in the General Course in 1901. There were 18 from Wellington, 16 from York, 11 from Simcoe, 10 from Wentworth, 8 each from Brant, Elgin, Grey, Halton, Huron, and Oxford, 7 from Perth, 6 each from Carleton, Middlesex, and Waterloo, 5 each from Bruce, Dundas, Lambton, Lincoln, and Ontario, and smaller numbers from other counties.

County Students.

By Legislative enactment, each county council of the Province has power to send one student to the College free of tuition. Of those on the roll in 1901, eighty were

nominated by county councils, and hence were exempt from the payment of tuition fees. The counties and districts which exercised the power of nomination last year (44 in number) were the following: Addington, Algoma, Brant, Bruce, Carleton, Dufferin, Dundas, Durham, Elgin, Essex, Glengarry, Grenville, Grey, Haldimand, Halton, Hastings, Huron, Kent, Lambton, Lanark, Leeds, Lennox, Lincoln, Middlesex, Norfolk, Northumberland, Ontario, Oxford, Parry Sound, Peel, Perth, Peterborough, Prescott, Prince Edward, Renfrew, Russell, Simcoe, Stormont, Victoria, Waterloo, Welland, Wellington, Wentworth, and York.

Changes in Staff.

There have been an exceptionally large number of changes in the College staff during the past year.

About the middle of the summer, A. T. Wiancko, B.S.A., Assistant in the Library and Instructor in German, left for a much higher salary in the Western States.

In the month of September, Rolland Craig, B.S.A., temporary assistant in the Physical Laboratory, left for a post-graduate course in Forestry at Cornell University.

Dr. A. E. Shuttleworth, who had been Professor of Chemistry for twelve years and had rendered good service in the department which he represented, resigned his professorship about the end of October, to accept a position at a very much larger salary with the Ontario Beet Sugar Co., of Toronto.

At the same time, I. N. Beckstedt, B.A., who had faithfully and efficiently filled the difficult position of Dean of Residence and Instructor in English and Mathematics for several years, resigned his mastership and returned to his *alma mater*, Queen's University, to study theology.

Early in December, Mr. A. McCallum, who had faithfully discharged the duties of Bursar for nearly 17 years, was suddenly cut off by an attack of pneumonia—taken ill Saturday night; dead Monday morning. His many friends in the College and city sympathize with his highly respected widow and family.

At the end of the year, G. A. Putnam, B.S.A., who has been the President's most faithful, efficient, and obliging secretary for twelve or fourteen years, resigned his secretaryship for a better position and a higher salary as assistant manager of the City Diary Co., Toronto.

The following officers have recently been appointed, most of them to fill the vacancies caused by death and voluntary resignations:

Robert Harcourt, B.S.A. ..... Professor of Chemistry.
W. P. Gamble, B.S.A. ..... Associate Professor of Chemistry.
W. C. Good, B.A., (Tor.) ..... Assistant in the Department of Chemistry.
Melville Cumming, B.A., B.S.A. ..... Assistant in Agriculture.
Dr. H. Streit ..... Assistant in Bacteriology.
W. J. Rutherford ..... Dean of Residence and Instructor in English and Mathematics.
Miss Alice Rowsome, B.A. (Tor.) ..... Assistant in Library and Instructor in French and German.
G. B. McCalla, B.S.A. ..... Fellow in Physics.
B. S. Pickett ..... President's Secretary.
Miss A. O. Hallett ..... Stenographer.
S. Springer ..... Bursar.

English, with a Reference to Some Recent Criticisms.

Now and then we hear through a newspaper or an agricultural journal that the "ideal" agricultural college does not teach anything but technical subjects (sometimes spoken of as *the practical branches*, such as field agriculture, live stock, dairying, poultry raising, and horticulture), with a smattering of a few sciences—how to handle manure, dig and plow the soil, plant and sow crops, and judge, breed, feed, and care for horses, cattle, sheep, and swine. That is all a farmer needs, and why should an agricultural

college spend time on anything else? Boys at an agricultural college studying English! Absurd! They might as well study Greek or Hebrew. So says our critic.

Professional men, like the writer of this article, should, of course, spend some time in learning how to speak and write their mother tongue, that they may be able to take their place and hold their own in the affairs of church and state; but what do farmers need with speaking and writing? Their business is to dig, delve, and grub; and their education should be strictly confined to the study and discussion of the best methods of performing these interesting operations. They are the foundation of our business, social, and political fabric, as some professional men and editors in their easy chairs love to call them—the stone and mortar down in the earth to support the beautiful and complicated structure of brick and wood so skilfully erected on top of them. That is their place. There they should stay; and if they must have some knowledge of English, let them go to the public and high schools for it.

In reply, I venture to affirm that not five in every fifty of the young men at our College could get the money and spare the time necessary to take a High School course and afterwards spend two years at the Agricultural College; and what benefit would it be to the forty-and-five, or 90 per cent, that English is well taught in the High Schools? If they can learn some English while they are studying technical subjects at the Agricultural College, well and good. If not, they must, like the great majority of the Short Course students in "the ideal Agricultural College." enter upon the duties and responsibilities of life in gross ignorance of this most important of all subjects to the average citizen in this country.

Further, it is all right, and in fact necessary, for students in a medical college to study the elements of inorganic and organic chemisty before proceeding to apply the principles of chemistry in the later technical studies or the practice of medicine; but not so, says our critic, with students of agriculture. It is a waste of time for them to study the principles of chemistry. They should proceed at once, "without a particle of instruction" in "elementary inorganic or organic chemistry"—at once to discuss "the fundamental principles and practices of agricultural chemistry and plant life" not studied or learned by themselves, but "delivered to them," *ex cathedra*, "without the fripperies of scientific formulas or nomenclature."

In answer to this, I would say that short courses and short cuts in education are all right in their place. They are, no doubt, the best thing for some people, young and old, and for those colleges which cannot induce any considerable number of students to stay long enough for anything else: but to commend them as the ideal thing for all farmers, and to maintain that students of agriculture, because of the hurry to get at results, should proceed at once to use terms which they do not understand and discuss the foundation principles and practices of agricultural chemistry, without a particle of instruction in elementary chemistry, is, to say the least, a very grave educational mistake—such a mistake as I would not expect to find in the editorial columns of one of our best papers.

We are disposed to give short courses their proper place; but to all suggestions, that nothing should be done in our Agricultural College towards raising Canadian farmers above the level of mere drudges,—hewers of wood and drawers of water for the educated classes of the community,—*we emphatically say no.* The purely practical, or bread-and-butter, subjects should be emphasized and receive a large share of time and attention, as they do in this College—*and with as good practical results as can be shown anywhere else*; but our young men should, at the same time, be taught in the simplest and most practical way and with as little expenditure of time as possible the fundamental princles of chemistry, botany, etc., as a preparation for the subsequent application of these principles in agricultural and animal chemistry, dairying, and horticulture. They should also, in view of the general neglect of the early education of young farmers, be taught a limited amount of practical English, to give them something like a reasonable facility in the use of their mother tongue.

Half the farmers in this country are shorn of their strength and fail to take their place and hold their own among the professional classes simply because they have never learned to speak and write fairly good English; and all the while we have wiseacres in the agricultural press and elsewhere telling us that English in an agricultural college is a non-essential, a sort of side issue,—about as much use as Greek or Hebrew.

Physics.

The usual instruction in physics was given in 1901, but less practical work was done than formerly, owing to a serious lack in class-room and labaratory accommodation for the large classes now in attendance,—a difficulty which will be overcome as soon as the new Physical and Biological Laboratories in course of construction are completed.

Some investigations in soil temperatures, especially as affected by cultivation, have been made during the year; but the results are yet incomplete and do not warrant the enunciation of definite conclusions.

Facts regarding destruction by lighting in this Province have been gathered and classified by Professor Reynolds, in the hope of reaching before long some conclusions that may be of value to the community.

Professor Reynolds has also investigated the Hanrahan System of cold storage, and has given some attention to the ventilation of stables.

For information on these points, see Professor Reynolds' report, Part II of this volume.

Biology.

Work in the Biological Department, in charge of Prof. Lochhead and his associate, Prof. M. W Doherty, has gone on as usual, although the department has been hampered and hindered very much for want of room and necessary appliances, especially microscopes, physiological apparatus, and an insectary. We hope to have sufficient room when the buildings in process of erection are completed; and we have made a strong appeal to the Government this year for the laboratory appliances so much needed.

Prof. Lochhead gave some attention to the fumigation of nursery stock throughout the Province in the spring of the year, and issued a bulletin on the *Hessian Fly* in the month of August. He also published a newspaper bulletin on *Wheat Rust* in August, and gave some special attention to *Black Rot in Grapes* during the fall. For facts and conclusions, so far as they were reached, see Prof. Lochhead's report, Part III of this volume.

M. W. Doherty, the Associate Professor in the department, conducted a number of experiments in spraying crops, especially oats, with Sulphate of Copper, or Blue Stone, to kill wild mustard. These experiments were made in some of the East Midland Counties —Ontario, Prince Edward, and other counties further east; and the reports received from farmers [illegible] the results as quite satisfactory. Hence we infer that the question of treating mustard in this way will depend on the cost of appliances, materials, and labor.

Prof. Doherty also added a considerable number of plants to our Herbarium for the instruction of future classes, collected data on the habits of birds, and prepared some notes on the migration of birds in this locality.

For full information on these and several other points, see Prof. Doherty's report, Part IV of this volume.

Veterinary Science.

Our veterinary surgeon, J. Hugo Reed, V.S., looks after the stock on the College farm and delivers courses of lectures on veterinary anatomy, pathology, obstetrics, and materia medica. Besides this he gives stable lectures to the first year students, and a thorough drill in "practical horse" to the second year, that is, practice, with talks and suggestions in judging for soundness, administering medicine, and performing minor operations. During the past year he has shortened the time devoted to anatomy, and has given considerable attention to horse judging in different classes —heavy draught, carriage, saddle, etc. For Dr. Reed's report of his work during the year, see Part VI of this volume.

Chemistry.

Our Professor of Chemistry, Dr. A. E. Shuttleworth, who served us faithfully for a number of years, and gave much attention to the beet sugar question after his return from Germany in 1899, resigned his position in the College about the middle of the Fall Term, to accept from the Ontario Beet Sugar Company a much larger salary

than we were paying him. Our Associate Professor of Chemistry, Robert Harcourt, B.S.A., was promoted to fill the vacancy; W. P. Gamble, B.S.A., who was assistant in Chemistry last year, was promoted to the position of Associate Professor; and W. C. Good, B.A. (Tor.), was appointed assistant in the Department, to enter upon his duties on the 1st January, 1902.

Dr. Shuttleworth, having devoted most of his time and attention to the sugar beet business during the year, is reporting direct to the Minister of Agriculture on that subject; and Prof. Harcourt, not having entered upon his duties as full professor till near the close of the year, has a shorter report than is usually furnished by the Chemical Department.

Analyses. A large number of analyses of water were made during the year for corporations and individuals throughout the Province; but the applications under this head became so numerous that we were at length forced to refuse all, except from creameries and cheese factories. Samples of sorghum ensilage, mill by-products, and soap for spraying San José scale were also analyzed and the results reported to the senders.

Research. Several chemical investigations have been in progress in connection with the Dairy Department: (1) to determine the loss of fat and casein and the effect on the acid, caused by the washing of curds; (2) to determine the products which result from the decomposition of the casein, or nitrogenous matter, of cheese when cured in cold storage, as compared with the products from curing in the ordinary way.

Sugar Beets Investigations to determine the suitability or unsuitability of different parts of Ontario for the production of sugar beets were continued throughout the year, tests having been made in 15 different localities by 25 experimenters in each locality. The yield of sugar from the beets grown in these localities varied from 14.5 to 17.3—average, 15.6 per cent. The purity varied from 83.7 to 90.6—average, 87.5; and the yield of beets was from 14 to 22 tons per acre—average, 17 tons, 495 lbs. For details, see Prof. Harcourt's Report, Part V of this volume.

Dairy Department.

Prof. Dean's Report for 1901 deals with the class-room and practical work done by the students in the General Course and by those who took the three dairy courses, viz., the Farm Dairy Course, the Short Creamery Course, and the Long Factory Course in both butter and cheese. It also describes a number of experiments made during the year.

Cheese-making. The year's experiments in cheese making dealt chiefly with the methods of caring for milk, the washing of curds, curing in light versus dark rooms, and curing at different temperatures, with the following results and conclusions:

(1) That cooling milk for cheese-making below 70° F. is necessary in hot weather, and that many of the troubles in making cheese in hot weather could be overcome by adopting some method of cooling the milk.

(2) That there is no advantage in washing curds, unless under special circumstances, but rather a loss of about one pound of cured cheese per 1,000 lbs. of milk. "Fast-working" curds and curds with bad flavors may be, and usually are, improved by washing, especially the former.

(3) That neither light nor the absence of light in a cheese-curing room has any effect on the quality of cheese cured in the room.

(4) That the curing of cheese in cold storage at a temperature of about 40° F. gives very satisfactory results.

As a consequence of the last conclusion, it is strongly urged that co-operative cold storage buildings be provided at central points, and that cheese, especially that made in July and August, be placed in these buildings *as soon as possible* after it is made. This seems necessary for the permanent success of the cheese trade.

Butter-making. The experiments in butter making were, to obtain more reliable information regarding the pasteurization of milk for butter-making, commercial butter cultures, and the moisture and salt-content of butter as affected by different methods of making.

Much pasteurization was done at 140°, 160°, 185°, 195°, and 200° F., and the results were published in a bulletin recently issued by Professors Dean and Harrison,—

pasteurization at a temperature of 185° F. being recommended for export butter and butter to be placed in cold storage.

Dairy Herd. The Dairy Herd averaged over 8,000 lbs. of milk and 326 lbs. of butter per cow in 1901. The Department is aiming at 10,000 lbs. of milk and 400 lbs. of butter per cow in the year.

See Prof. Dean's report, Part VII of this volume.

Farm and Feeding.

In Prof. Day's report, Part VIII of this volume, will be found a short but clear account of the crops grown on the farm during the year, with observations on the condition and preparation of the soil for each crop, and more detailed information regarding experiments in feeding steers and swine.

Silage for Steers. Steers fed on silage, hay, and meal, made somewhat larger gains and at considerably less cost than steers fed on roots, hay, and meal,—the hay and meal being the same in each case.

Those fed on silage, hay, and meal consumed less dry matter per pound of gain than those fed on roots, hay, and meal,—which will be noted as an important matter in view of the fact that the labor necessary to produce a ton of dry matter in roots cost $9 40 and in silage $3.10.

Corn Meal for Steers. Steers fed on corn meal made larger gains and required less meal per pound of gain than steers fed on pea meal, and than steers fed on equal parts of pea meal and corn meal.

Roots for Hogs. Hogs fed equal parts by weight of meal and roots, made more economical gains and produced a better quality of bacon than hogs fed meal alone.

Rape for Hogs. Hogs fed on rape pasture and a liberal meal ration required much more meal for a pound of gain than hogs fed rape and the same meal mixture in pens. The quality of bacon was first class from both.

The Bacon Hog. The Yorkshires proved most suitable for producing export bacon, of the six breeds used in experiment, viz, Yorkshire, Berkshire, Tamworth, Duroc Jersey, Chester White, and Poland China.

See Prof. Day's report, Part VIII of this volume.

Inter-Collegiate Stock Judging Competition in 1901.

At the International Live Stock Exposition, held in Chicago during the first week of December, students from eight agricultural colleges competed for supremacy in judging different classes of live stock. The students were required to judge nineteen different classes of stock, made up as follows:

Cattle: Shorthorns, 2 classes; Aberdeen-Angus, 2 classes; Herefords, 2 classes; fat cattle, 2 classes; Red Polls, 1 class.

Sheep: One class each of Cotswolds, Shropshires, and fat sheep.

Swine: Poland-Chinas, 2 classes; fats hogs, 1 class; bacon hogs, 1 class.

Horses: Clydesdales, 2 classes; market horses, 1 class.

Prizes were given in each class of stock to individual students, and in addition to these prizes, a valuable challenge trophy, known as the "Spoor Trophy," was put up for competition among the colleges and awarded on the highest aggregate score made by any three students of one institution. Our college sent a team of five students, viz., W. A. Dryden, Brooklin, Ontario; G. I. Christie, Winchester, Ontario; L. A. La Pierre, Paris, Ontario; R. H. Williams, Corbetton, Ontario; and F. S. Jacobs, Minesing, Ontario.

Throughout the competition, our students did good, steady work. In nearly every class some of them stood among the first seven in proficiency. In three classes we had a man at the top of the list, and in four others one of our men stood second. The character of their work can be judged best from the fact that they stood second in the Spoor Trophy competition, which, as was previously explained, was decided by the standing of three students from one college. The three of our students who stood highest in the latter competition were Messrs. Dryden, Christie, and La Pierre. Seven out of the eight colleges entered in the Spoor Trophy competition, and they ranked in the following order:

Iowa, Ontario, Illinois, Michigan, Wisconsin, Indiana, and North Dakota.

It is an interesting fact that the students from the colleges ranking first, second, fourth, and fifth in proficiency were trained by ex-students of our own institution.

Everything considered, therefore, our men made a very creditable showing, and the Province may justly feel proud of their record.

Horticulture.

In the Horticultural Department, the work of the past year has been along the following lines: Instruction, experiments (college and co-operative), preparation for exhibit at the Pan-American, inspection of Fruit Experiment Stations and report thereon, and practical addresses at orchard meetings in several localities.

So far, our experimental work in this department has been in variety tests with strawberries, raspberries, blackberries, currants, gooseberries, tomatoes, and certain plants and flowers,—in our own garden and orchard; and with various small fruits in co-operative work on about 1,000 farms throughout the Province. For particulars, results, and conclusions, see Prof. Hutt's report, Part IX of this volume.

One hundred jars of choice varieties of small fruits were put up under the supervision of Prof. Hutt and sent to the Pan American, where they attracted a great deal of attention and were awarded a silver medal.

Bacteriology.

There seems to be no limit to the field for practical and promising investigation under this head: questions about milk, butter, and cheese; problems regarding tuberculosis, hog cholera, anthrax, glanders, roup in fowl, foul brood in bees, etc., etc.,—all calling for very careful, patient, and persistent investigation, with a view to answers and solutions that may be of value to the community.

The demand for instruction in bacteriology is also much greater than it was a few years ago, especially among dairy students; and the outcome of it all is, that we are at a standstill for lack of laboratory accommodation and suitable equipment both for instruction and investigation in this department. For want of sufficient room and the necessary appliances, we have to divide our dairy students into six sections, getting round the class only once a week; and as a consequence we are unable, during the session of the Dairy School, to give them anything like what they are asking for and really need to equip them for their work.

To put us in proper shape for the work demanded of us in this department, we should have at least $30,000 for a new laboratory, laboratory equipment, and an isolation stable for experimental work and the treatment of sick animals—precisely the sum which the Michigan Agricultural College is investing in a Bacteriological Laboratory, apart from equipment and isolation stable. I hope some good Canadian who has the ability and heart to do this thing for the farmers of Ontario, will come to our relief.

Prof. Harrison makes a number of personal visits to cheese factories and elsewhere in the Province, to assist cheese-makers and others who need assistance in matters connected with his department; and he announces in his last report that his services will, as far as possible, be at the disposal of cheese and butter makers, farmers, stockmen, and veterinarians who may require help on bacteriological lines.

Research. A large amount of research work is under way in the department, especially on dairy lines—

(1) A large quantity of milk was pasterurized at different temperatures for butter-making during the year, and the results were set forth in Bulletin No. 117, published by Professors Dean and Harrison a short time ago,—showing that 185° F. gives the best results in butter for export or to be put into cold storage.

(2) A good deal of work has been done on what is known as "bitter milk," which has given much trouble in some factories; and a bulletin on the subject will soon be published.

(3) Investigations on "Yeast and its Household Use" were published a short time ago in Bulletin 118.

See Prof. Harrison's report, Part X of this volume.

Field Experiments at the College and Co-operative Experiments Throughout the Province.

The work of the Experimental Department during the past year has included practical tests with farm crops on about 2,000 field plots; a heavy correspondence with farmers throughout Ontario; the presentation of the results of experiments through reports, newspaper articles, meetings of Farmers' Institutes, and farmers' excursions; and co-operation with the Ontario Agricultural and Experimental Union in carrying on experiments on about 3,000 Ontario farms

Field Experiments at the College. The market value of the wheat, barley, oats, and rye; the peas, beans, buckwheat, corn, and hay; and the potatoes, turnips, mangels, and carrots grown in Ontario annually is upwards of $100,000,000. The Experimental Department conducted upwards of 100 distinct experiments with farm crops in 1901, with the object of securing information which might be useful in increasing both the quality and the quantity of the farm crops of the Province. Each experiment was along some definite line which had been carefully thought out. Every test was conducted with great care, and the principal results of most of the experiments are presented in the report of the Experimentalist, Part XI of this volume. Even to enumerate the various field experiments and give the most important results therefrom would occupy several pages, and the reader is, therefore, referred to the summary of results presented in the report of the Experimentalist.

Co-operative Experiments in Agriculture. During the season of 1901, co-operative experiments were conducted by 1,185 experimenters on grain crops; 222 on root crops; 146 on forage crops; 180 on culinary crops; 66 on forage experiments; and 261 on other lines.

Both the financial and the educational results of this work throughout Ontario are of much value. The benefits are not confined to the experimenters themselves, but are shared by thousands of others who examine the growing crops, attend the annual meetings, read the annual reports, or become familiar with the results through the columns of the public press, in the meetings of the Farmers' Institutes, and in various other ways. For the results of the co-operative experiments in 1901, the reader is referred to the Annual Report of the Ontario Agricultural and Experimental Union.

Agriculture in Europe. The Experimentalist visited upwards of fifty of the leading Agricultural Colleges and Experiment Stations in nine of the countries of Europe within the past year. A few observations on the agriculture of the countries visited will be found in the report of the Experimentalist, Part XI of this volume.

Poultry Raising.

I have already spoken of the four weeks' Special Course in Poultry Raising, and may add here that the Regular Course students at the College in 1901 received the usual amount of instruction and practical training in this department.

Fattening Chickens. Our Poultry Manager has fattened and sold a large number of chickens during the past year—some to the College and a much larger number to dealers in Toronto and Montreal; and in the course of his year's work and experiments, he has obtained results which seem to warrant the following conclusions:

(1) That there is more profit in fattening chickens which weigh about 3½ lbs. each when put into the crates, or slatted coops, than in fattening chickens which weigh 4 lbs., 4½ lbs., or more. Birds under 3 lbs. each did well in the crates; but they were rather small to be fed by the cramming machine. Birds weighing 3½ lbs. and those under 3 lbs. made a pound of gain much more cheaply than heavier birds.

(2) That in feeding chickens, the best results and most profit are got from feeding them *out of a trough* in slatted coops for the first two weeks and *by the cramming machine* the last ten days,—the birds being kept in the same coops for the last ten days, but being taken out at meal time (twice a day), fed by the machine, and put back into the coops. The second best results are got by feeding from a trough in slatted coops for the full period of three weeks and three days, or thereabouts.

The least satisfactory results are got from birds allowed to run loose in a pen while they are being fattened. Those fed loose at the College made much smaller gains than those fed in the slatted coops, and the gains which they made cost nearly one-half more.

The Cramming Machine. Will it pay to buy a cramming machine for fattening chickens? Yes and no. *Yes*, if you are catering to the best market and wish to furnish the finest quality of fowl, especially if you are fattening birds that have been fairly well fed from the time they were hatched, as the greatest advantage from the machine is with birds that lose their appetite or go "off feed" to some extent after being fed in the coops for two weeks or so; *No*, if you are feeding for ordinary market purposes and cannot very well spare the time, night and morning, for individual feeding with the machine.

Chickens such as we buy from farmers—usually quite thin when they come in—fatten very rapidly in the crates, or slatted coops; and it would scarcely pay to buy a machine for feeding such chickens.

Egg Production in Summer. By careful tests made by our Poultry Manager last summer,—weighing and charging food, etc., and keeping strict count of eggs,—it was found that Andalusians, enclosed in a yard which was connected with a roosting house, produced eggs at a cost of five cents a dozen, and Plymouth Rocks at a cost of about 6 cents a dozen; but, as the Rocks are much better winter layers than the Andalusians, it is probable that for the whole year they would make a better showing than the Andalusians.

Feeding Ducks. After careful experiment, our Poultry Manager, Mr. Graham, has come to the conclusion that nothing is gained by feeding ducks in crates or with the cramming machine—that ducks will grow and put on flesh just as fast when fed loose in a small yard as when put into crates or fed by the cramming machine,—in other words, that you cannot force into a duck's crop any more food than it will eat of its own accord.

See Mr. Graham's report, Part XII of this volume.

Bee-Keeping.

We have not a regular department of apiculture; but we have a course of lectures (20 in number), with some practical demonstrations, delivered to our first year students in the Fall Term. The lecturer at present in charge of the work is H. R. Rowsome, of Burlington. Mr. Rowsome was a pupil of Mr. Holtermann's; and I was pleased to notice that in the last course of lectures especially, he succeeded in securing the attention of the students and in arousing considerable interest in the subject of bee-keeping.

For Mr. Rowsome's account of his work, see Part XIII of this report.

Military and Gymnastic Drill.

We do not devote much time to drill; but we think that an hour a day for first and second year students during portions of the Fall and Winter Terms is well spent in setting the boys up and thereby improving both their appearance and their manners. We are fortunate in having Captain Walter Clark, an instructor so well and favorably known, for the work required under this head. He always secures the respect of the young men placed under him, and never fails to straighten them up and improve their general bearing.

Institute Excursions.

We had about the usual number of farmers' excursions in 1901—between 25,000 and 27,000 people—nearly all under the auspices of the Farmers' Institutes; and I am glad to be able to report that the majority of those who visit the College year after year, come, not so much for an outing or mere amusement, as to learn something that may be of use to them in the work or management of their own farms. This explains their coming here for so many years in succession.

Class-Room Work.

The class-room work in the different departments of our College course has gone on as usual. A fair proportion of first and second year students gained a respectable

standing in our College examinations; but the percentage of failures is still very large, resulting in some cases from idleness, but in most instances from a lack of early training in the elementary branches of an English education.

The fourth year examinations were conducted by examiners appointed by the Senate of the University; and those of the first, second, and third years by the professors and instructors of the College.

Bachelors of the Science of Agriculture.

The usual examinations for the B.S.A. degree were held in the month of May; but owing to the change in the length of our course for this degree from three to four years, there was only one candidate—

Camming, M, B.A ..... Truro, Nova Scotia,
who passed *magna cum laude*.

Recipients of Associate Diplomas.

Atkinson, Alfred ..... Egmondville, Huron, Ont.
Broderick, F. W ..... St. Catharines, Lincoln, Ont.
Carroll, W. R ..... Norwich, Oxford, Ont.
Cowle, W. G ..... Toronto, Ont.
Craig, H. A ..... North Gower, Carleton, Ont.
Cutting, A. B ..... Truro, Nova Scotia.
de Coriolis, E G ..... Forest Side, Island of Mauritius.
*Delong, H. M ..... Brooklin, Ontario, Ont.
Dixon, C. H ..... Dromore, Grey, Ont.
Elderkin, D. T ..... Ottawa, Carleton, Ont.
Everest, R. E ..... Scarboro' Junction, York, Ont.
Fairweather, A. W ..... Alma, Wellington, Ont.
Ferguson, Jas ..... Spring Hill, Carleton, Ont.
Galbraith, D. H ..... Ellesmere, York, Ont.
Galbraith, S. M ..... Ellesmere, York, Ont.
Gilpin, B. C ..... Gorrie, Huron, Ont.
Goodchild, A ..... Craigleith, Grey, Ont.
Gunn, W. H ..... Ailsa Craig, Middlesex, Ont.
Higginson, J. A ..... Chilliwack, British Columbia.
Horton, D. H ..... North Pelham, Welland, Ont.
Johnston, B. C ..... Fairfield Plains, Brant, Ont.
Ketchen, A. P ..... Brucefield, Huron, Ont.
Klinck, L. S ..... Victoria Square, York, Ont.
Murray, H ..... Mabou, Nova Scotia.
McDonald, W. T ..... Teeswater, Bruce, Ont.
McLean, J ..... Ailsa Craig, Middlesex, Ont.
Newman, L. H ..... Andrewsville, Lanark, Ont.
Partridge, A. W ..... Crown Hill, Simcoe, Ont.
Peart, H. S ..... Nelson, Halton, Ont.
§Reed, P. E ..... Georgetown, Halton, Ont.
Rivara, J. B ..... Buenos Ayres, Argentine Republic
Russell, J. M ..... Freeman, Halton, Ont.
Rutherford, W. J ..... South Mountain, Dundas, Ont.
Sharp, T. H ..... Spanishtown, Jamaica, Ont.
Shuh, C ..... Waterloo, Waterloo, Ont.
Sutherland, A. T ..... Stratford, Perth, Ont.
Weekes, H. M ..... Glencoe, Middlesex, Ont.

*To take supplemental examinations in Veterinary Anatomy, Botany, and Apiculture.

§To take a supplemental examination in Agricultural Chemistry.

First-Class Men.

The work of the College is divided into departments, and all candidates who obtain an aggregate of seventy-five per cent of the marks allotted to the subjects in any department are ranked as first-class men in that department. The following list contains the names of those who gained a first class rank in the different departments at the examinations in 1901, arranged alphabetically :

First Year.

Barber, T. C, Yorkton, Assa, in one department,—Physical Science.
Barton, H., Vankleek Hill, Ont., in one department,—Physical Science.
Colter, G. L, Mouth of Keswick, N.B., in one department,—English and Mathematics.
Dewar, W. R., Fruitland, Ont, in three departments,—English and Mathematics ; Physical Science ; Biological Science.
Fulmer, H. L, Ruthven, Ont., in three departments,—English and Mathematics ; Physical Science ; Biological Science.
Houser, H. W., Campden, Ont., in four departments,—English and Mathematics ; Physical Science ; Biological Science ; Agriculture.
Johnston, J. M., Carlow, Ont., in one department,—English and Mathematics.
McCallum, J. M., Shakespeare, Ont., in three departments,—English and Mathematics ; Physical Science ; Biological Science.
Park, C. L., North Seneca, Ont., in one department,—English and Mathematics.
Paul, R. H., Bath, Ont., in one department,—English and Mathematics.
Readey, J. C., Rosetta, Ont., in one department,—Physical Science.
Strachan, C. L., McKenzie, Man., in one department,—English and Mathematics.
Thom, C. C., Elma, Ont, in one department,—Biological Science.
Wilson, J, White Church, Ont., in one department,—Physical Science.

Second Year.

Elderkin, D. T., Amherst, N.S., in one department,—English and Mathematics.
Ferguson, Jas, Spring Hill, Carleton, in one department,—English and Mathematics.
Ketchen, A. P., Brucefield, Ont., in two departments,—English and Mathematics ; and Physical Science.
Klinck, L. S., Victoria Square, Ont., in one department,—English and Mathematics.
Patridge, A. W., Crown Hill, Ont., in three departments,—English and Mathematics ; Physical Science ; and Biological Science.
Russell, J. M., Freeman, Ont., in two departments,—English and Mathematics ; and Biological Science.
Rutherford, W. J., South Mountain, Ont., in one department,—English and Mathematics.

Scholarships.

Scholarships of $20 each in money were awarded for groups of subjects in first year work as follows :

Highest standing, with a minimum of forty per cent. of the marks for each subject and an aggregate of seventy-five per cent. of the total number of marks allotted to the subjects in the group—

I. English, Mathematics, Book-keeping, and Drawing,—*H. L. Fulmer.*
II. Mechanics, Physics, Chemistry, and Geology,—*W. R. Dewar.*
III. Botany, Zoology, Horticulture, and Apiculture,—*J. M. McCallum.*
IV. Agriculture, Poultry, Dairying, and Veterinary Science,—*H. W. Houser.*

Prizes.

Prizes were given as follows :

Essay on "The Best Models of Victorian Prose Literature : Their Leading Characteristics Compared with those of their Most Noted Contemporaries and Predecessors."—$10 in books to *Jas. Ferguson*, Spring Hill, Carleton, Ont.

First place in general proficiency on first and second year work, theory and practice,—$10 in books to *H. M. Weekes*, Glencoe, Middlesex, Ont.

Highest standing in general proficiency with first-class honors in one department at the University Examinations for the B. S. A. degree,—$10 in books to *M. Cumming*, Amherst, N.S.

GOVERNOR-GENERAL'S SILVER MEDAL.

Highest in general proficiency, second year, 1900-1901. *A. W. Partridge*, Crown Hill, Simcoe, Ont.

ONTARIO AGRICULTURAL COLLEGE,
Guelph, December 31st, 1901.

JAMES MILLS,
President.

FINANCIAL STATEMENT FOR 1901.

I. COLLEGE EXPENDITURE

(a) College Maintenance.

1. *Salaries and Wages*	$22,839 60	
2. *Food :*		
Meat, fish, and fowl	5,173 97	
Bread and biscuit	979 13	
Groceries, butter, and fruit	5,637 00	
3. *Household Expenses :*		
Laundry, soap, and cleaning	319 50	
Women servants' wages	1,932 81	
4. *Business Department :*		
Advertising, printing, postage, and stationery	1,139 60	
5. *Miscellaneous :*		
Maintenance of Chemical Laboratory	406 81	
" Physical "	349 28	
" Biological "	372 32	
" Bacteriological "	348 04	
Library, reading room, books, papers, and periodicals	838 55	
Scholarships	123 25	
Unenumerated	1,003 01	
Temporary assistance	85 14	
Experiments in soil physics	100 00	
		$41,708 01

(b) Maintenance and Repairs of Government Buildings.

Furniture and furnishings	1,257 22	
Repairs and alterations	1,073 72	
Fuel	4,481 47	
Light	1,273 81	
Sewage disposal	427 13	
Unpaid accounts	369 87	
		8,883 22
		$50,591 23

College Revenue.

Fees	$3,110 95	
Balances on board account, after deducting allowances for student labor	7,456 08	
Gas used by students in laboratories	120 00	
Supplemental exams	10 00	
Sale of tuberculin	5 40	
Contingencies	8 85	
		10,711 28
Net expenditure for year		$39,879 95

II. FARM EXPENDITURE.

(a) Farm Proper and Experimental Feeding.

1. *Permanent Improvements*		290 54	
2. *Maintenance :*			
Wages of foremen and men	3,341 45		
Live stock—Cattle for feeding, etc.	4,079 63		
Maintenance of stock	1,403 22		
Seeds	231 09		
Binding twine			
Repairs and alterations, blacksmithing	453 54		
Furnishings	196 78		
Tools and implements	196 94		
Advertising, printing, postage, and stationery	42 65		
Fuel and light	34 73		
Experimental feeder	360 00		
Contingencies	174 75		
		$10,514 78	
			$10,805 32

REVENUE.

Sale of Cattle :			
4 steers, 4,660 lbs. at $3 85	179 40		
2 " 2 540 " 4.50	114 30		
22 " 29,400 " 5.25—$1.20 weighing	1,542 29		
6 " $44.00 each	264 00		
6 cows	258 00		
1 steer	36 00		
1 pure bred calf	80 00		
2 grade calves	5 50		
		2,479 49	
Sale of Pigs :			
3 hogs, 1,570 lbs. at $4.00	62 80		
1 " 640 " 4.25	27 20		
1 " 396 " 4.50	17 82		
1 " 134 " 5.00	6 70		
12 " 2,036 " 5.25	106 89		
18 " 3,227 " 5.50	177 48		
24 " 4,608 " 6.00	276 48		
8 " 1 440 " 6.15	88 56		
11 hogs, 2,901 lbs. at $6.50	123 56		
11 " 2,022 " 6 60	133 45		
39 " 7,193 " 7.00	503 50		
33 " No weights	559 00		
		$2,083 44	
Sale of Sheep and Lambs :			
97 lambs, 11,765 lbs. at $4.75	$558 82		
7 " No weight	40 00		
		598 82	
Sale of Wheat :			
17 bush. at 66c	$11 22		
		11 22	
Sale of Ensilage :			
6,800 lbs. at $2.00 per ton	$6 80		
		6 80	
Sale of Hay :			
400 lbs. at $10 per ton	$2 00		
		200	
Sales of Milk :			
4,150 lbs. at 85c. per cwt.	$35 27		
3,185¼ quarts at 4c	127 41		
		162 68	
Sales of Wool :			
290 lbs. unwashed wool		23 96	
Sales of Hides and Skins :			
8 sheep skins		7 65	
Sales of old Horses (2)		55 00	
Service of Animals		214 00	
Sale of Old Iron		1 65	
Sale of Feed		332 20	
Sale of Wool Refuse		90	
			5,979 81
Net expenditure, allowing nothing for supplies to College, feed for dairy stock, keep of horses for College and other departments, etc., etc.			4,825 51

NOTE.—This statement includes only the cash transactions of the year. A profit and loss statement of the Farm Proper will be found in Prof. Day's report, Part VIII of this volume, p. 66.

(*b*) FIELD EXPERIMENTS.

Permanent improvements		$77 50	
Experimentalist—salary	$1,500 00		
Foreman—salary	470 00		
Teamsters—wages	570 00		
Other laborers—wages	2,107 90		
Seeds	364 10		
Manure	103 60		
Furnishings and repairs, blacksmithing, etc	308 15		
Printing, postage and stationery	64 44		
Implements and tools	63 68		
Contingencies	422 35		
		5,974 22	
Net expenditure on field experiments			$6,051 72

III. DAIRY DEPARTMENT.

(a) Dairy School.

Wages of instructors	1,385 00	
Engineer (3 months)	90 00	
General helper (3 months)	75 00	
Board of engineer	30 00	
Furnishings, repairs, painting, etc	189 61	
Dairy appliances	255 75	
Fuel and light	249 68	
Advertising, printing, postage, and stationery	132 27	
Books, papers, etc	1 75	
Expenses of Judges	16 50	
Expenses of inspecting factories	15 97	
Milk for use in school	2,728 58	
		$5,255 31

Revenue.

Fees	$51 00	
Sales of Butter:		
8,169 lbs. at from 15 to 24c	1,806 58	
Sales of Cheese:		
4,633½ lbs. at from 8 to 10½c	458 58	
Sales of Skim milk and Whey:		
21,050 lbs. skim-milk at 10c. per 100 lbs	21 05	
whey—season's make	10 00	
Sales of Cream:		
5 quarts at 20c	1 00	
Contingencies—breakages	5 40	
Sales of Milk, Buttermilk, and Starters	1 77	
		$2,355 38
Net expenditure		,899 9

(b) Experimental Dairy.

Foreman (9 mos.)	447 50	
Cheesemaker (9 mos.)	499 95	
Assistant in experimental work (9 mos.)	270 00	
Wages of cattlemen, etc	570 74	
Purchase of milk for experiments	3,072 34	
Cows	596 65	
Feed and fodder	646 12	
Furnishings and repairs	562 21	
Fuel and light	573 36	
Laboratory expenses, chemicals, etc	65 65	
Contingencies	208 63	
Advertising, printing, postage, and stationery	76 55	
		7,589 70

Revenue.

Sales of Butter:		
16,428½ lbs. at from 13c to 23c	3,354 94	
Sales of Cheese:		
5,627¾ lbs. at from 5c to 11c	528 52	
Sales of Milk:		
57,240 lbs. at from 97c to $1 per 100 lbs	567 63	
1,202¾ quarts at 4c per qt	48 11	
Sales of Skim-milk and Whey:		
40,640 lbs. of skim-milk at 10c per 100 lbs	40 64	
Sales of Cream:		
316 quarts at from 15c to 22c	52 10	
Sales of Cattle:		
15 grade calves, sold when a few days old	42 25	
13 grade cows	335 50	
Refund of Expenses	2 45	
Sales of 2 Cow Hides	6 25	
Sales of old Wagon and old Buggy	25 00	
Sales of Buttermilk	20	
		5,003 59
Net expenditure		2,595 11

IV. POULTRY DEPARTMENT.

Salary of manager	700 00	
Temporary assistance	295 33	
Purchase of stock	80 74	
Furnishings, repairs, etc	175 65	
Feed, etc	327 19	
Fuel, light, and contingencies	123 40	
Experiments in fattening poultry	486 50	
		2,188 81

REVENUE.

Sales of Eggs:			
For hatching, 62 sittings at $1.00	62 00		
" 31 " $1.50	46 51		
For domestic use, 738 doz. at 10c to 25c per doz	110 69		
		219 20	
Sales of Poultry:			
Sales of live birds at from 75c to $5.00	114 53		
" dressed poultry at from 7½c to 12c per lb	350 05		
Sale of feathers	80		
" old box	40		
		465 78	
			684 98
Net expenditure			1,503 83

V. HORTICULTURAL DEPARTMENT.

Permanent improvements	174 94		
Maintenance:			
Salary of head gardener and foreman	700 00		
Salary of assistant gardener and florist	540 00		
Salary of assistant in greenhouses	380 00		
Teamster	360 00		
Wages of laborers	1,452 23		
Manure and fertilizers	92 95		
Seeds, bulbs, plants, trees, etc	559 80		
Furnishings, repairs, implements, and tools	271 96		
Fuel and light	751 27		
Contingencies	168 97		
		5,277 18	
		$5,452 12	

REVENUE.

Sale of Onions	50		
" *Strawberries*	1 00		
" *Fruit Trees*	19 82		
		21 32	
Net expenditure			5,430 80

Note.—Ordinarily there is no revenue from this department, as the produce is used by the College; and, because of complaints from Guelph market gardeners, the department is not allowed to sell even the surplus.

VI. MECHANICAL DEPARTMENT.

Salary of foreman	700 00		
Tools, fuel, and light	99 97		
		$799 97	

SUMMARY.

Total net expenditure:		
I. College and Government Buildings		39,888 80
II. Farm:		
1. Farm proper and Experimental Feeding Department	4,825 51	
2. Field Experiments	6,051 71	
		10,877 23
III. Dairy Department:		
1. Dairy School	2,899 93	
2. Experimental Dairy	2,595 11	
		5,495 04
IV. Poultry Department		1,503 83
V. Horticultural Department		5,430 80
VI. Mechanical Department		799 97
Total net expenditure in 1901		$63,995 67

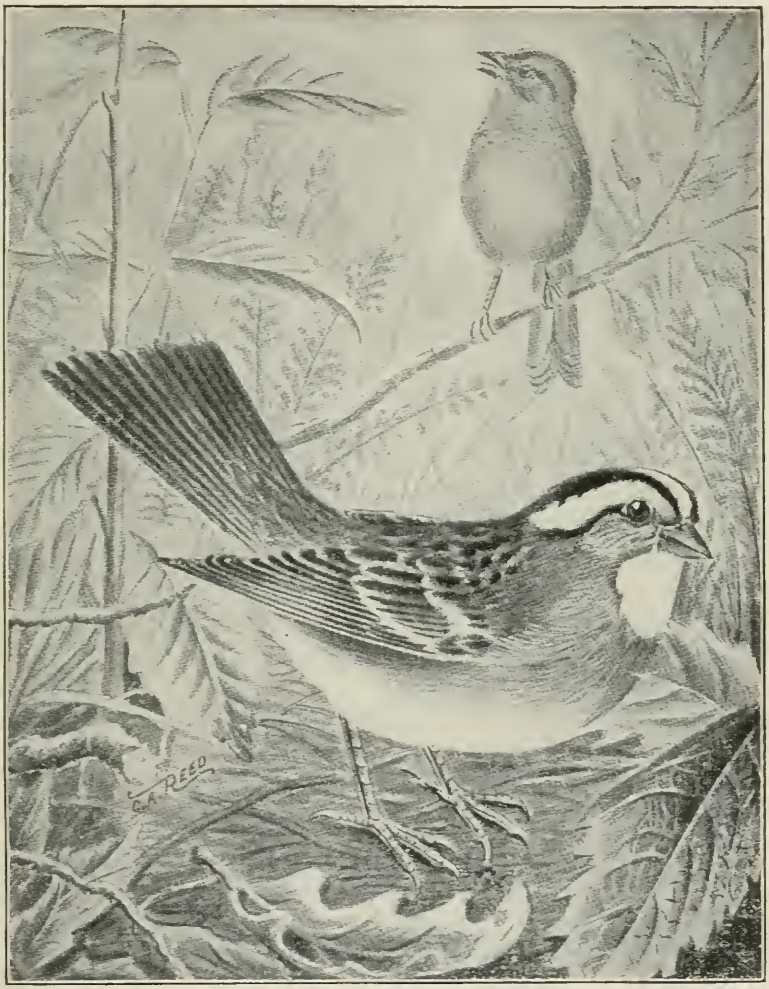
JAMES MILLS,
President.

Main Building and Chemical Laboratory.

Experimental Department Building and Bacteriological Laboratory.

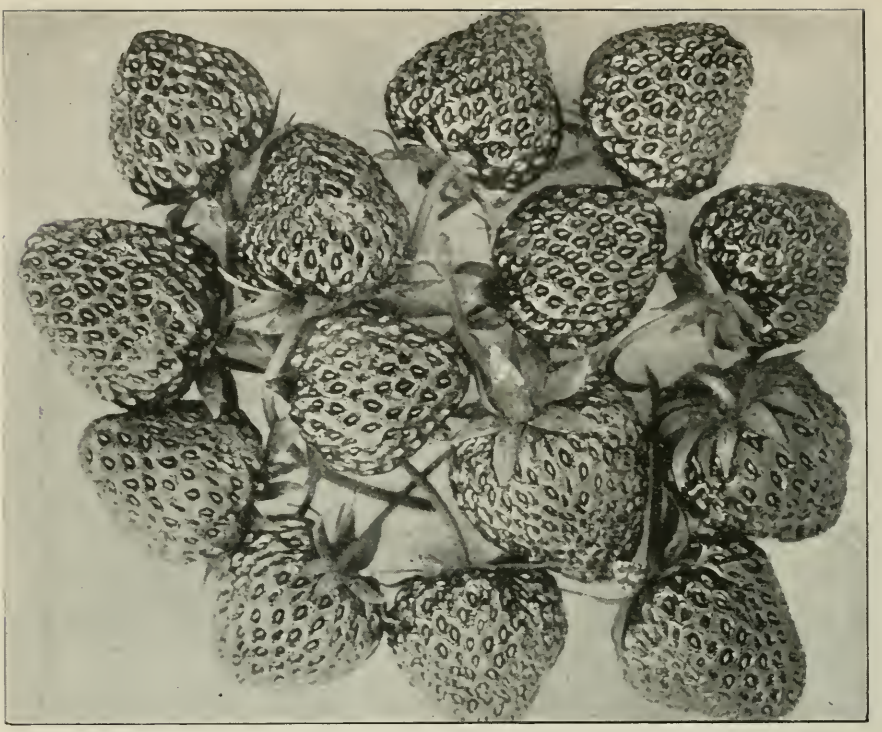
Barn and other Farm Buildings.

TREE SPARROW —(*Spizella Monticola.*) P 31.

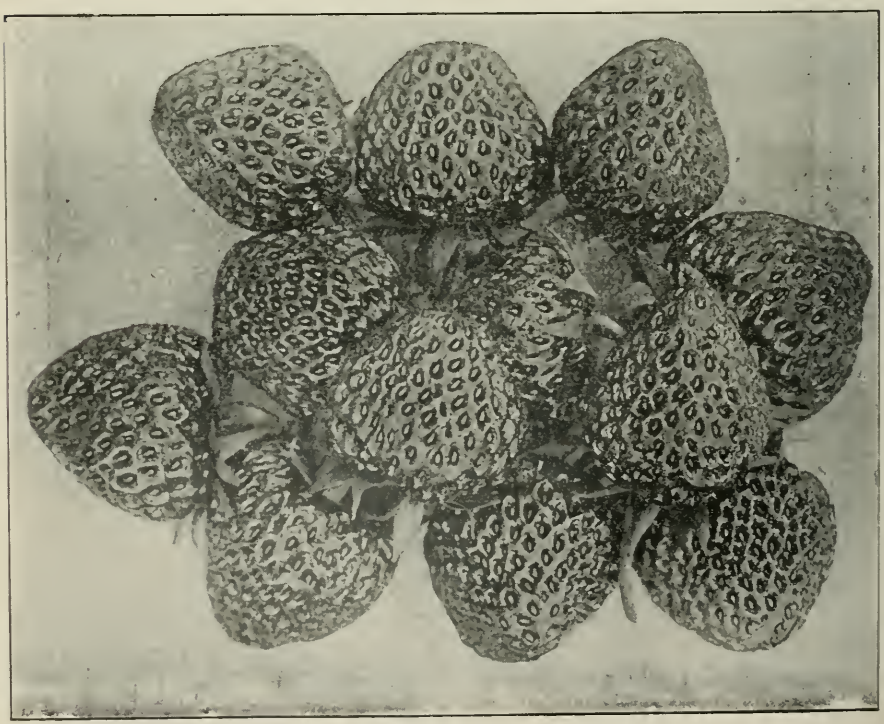


White Throated Sparrow.—(*Zonotrichia albicollis.*)

P. 31



SADIE. P. 69

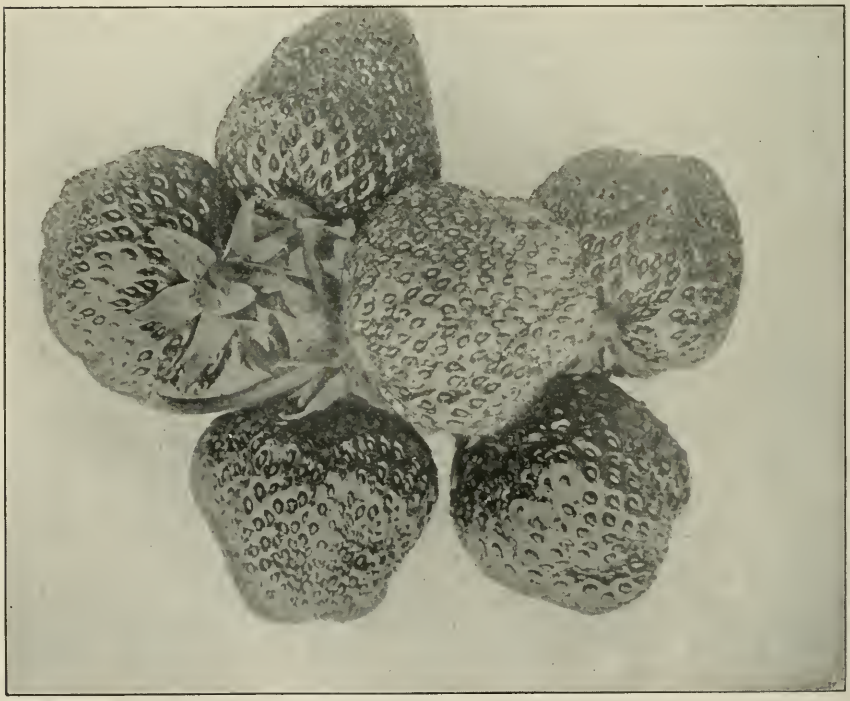


WESLEY. P 69.

VAN DEMAN. P. 69

CLYDE. P. 69

TENNESSEE PROLIFIC. P. 69



SAUNDERS. P. 69

PART II.

REPORT OF THE PROFESSOR OF PHYSICS.

To the President of the Ontario Agricultural College :

SIR,—I have the honor to present herewith my report on the work in the departments of English Literature and Physics.

REPORT ON THE WORK IN ENGLISH.

Some slight changes in the work in English have been introduced this year. More prose authors and fewer poetical authors are being studied, the prose being read principally as models of style. Also, text-books on Rhetoric have been adopted in all the classes, with a view to making the study of rhetoric and composition more definite and exact.

Public Speaking. The importance of public speaking is being practically recognized on all sides. The College Literary Society, previous to this year, formed one body. This year the Society has been divided into three sub-societies, each meeting once a week. The constitution of the Society provides for special encouragement of public speaking. This departure, added to the methods previously in vogue among the students, has already given markedly good results.

Perhaps nothing has produced better results in the way of public speaking than the organization of a class, as part of the regular college work, for special instruction in declamation and debating. Mr. Cumming has charge of this class, and his well-known ability as a speaker, together with his first-rate scholarship, makes him specially fitted for the work. As might have been expected, the best possible results have been realized.

INSTRUCTION IN PHYSICS.

During the last year or two the instruction given to the classes in Agricultural Physics has unavoidedly suffered a relapse. Our accommodation for lectures and laboratory work has always been small, and the rapid increase in numbers during the last two years has made the class-room and the laboratory altogether too small and inadequate. Consequently, last year some of the most important parts of the practical work in Physics were omitted. Through the liberality of the Legislature, however, this department will soon be amply accommodated. In the new building there will be provided for Physics one large laboratory capable of accommodating 50 or 60 students, two smaller ones, a class-room and two offices.

With regard to assistance, by appropriating part of the grant intended for maintenance of the laboratory supplies, supplemented by a generous allowance by yourself from the general college funds, I have been able to retain the services of an assistant continually through the year. Mr. R D. Craig, B.S.A., remained with me until September, when he left for Cornell to pursue a post-graduate course. Since his departure I have been assisted by Mr. G. B. McCalla, B S.A. Both of these gentlemen have rendered capable assistance in the work of this department.

INVESTIGATIONS UNDERTAKEN.

A partial report of the various investigations undertaken by the Department of Physics is submitted herewith. Some work has been done on soil temperatures, especially as affected by cultivation. But our results are narrow and indefinite, and require to be supplemented by further investigations before being published. Facts concerning destruction by lightning have been collected from a large number of observers

over the Province. The alarming increase in the destruction of barns by lightning, as reported by various insurance companies and some questions from correspondents, suggested this investigation.

There is also a report on the Hanrahan Cold Storage. This system has given excellent results, both in temperature and humidity. An even temperature has been maintained, with a gradual rise as the season advanced. No dripping from the ceiling, or mould on the lining of the refrigerator or on the products stored has been observed. With regard to absorption of objectionable odors, the system has been as efficient as should be expected ; nevertheless, it has not been by any means so perfect in this respect as the originator claimed it would be. It is unscientific to look for perfectly pure air in a storage room where there is *circulation* only. Pure air is possible only with *ventilation*, that is, the frequent introduction of fresh air from an outside source.

A simple and inexpensive plan of ventilation has been put into operation at the farm stables. In consultation with Prof. Day, whose especial duty it was to consider the cost of carrying out the proposals, I prepared the plans, the gist of which may be found toward the end of the report.

Destruction by Lightning in Ontario, 1901.

Early in the year we distributed the following circular as widely as possible over Ontario, principally among students and ex-students of the Ontario Agricultural College, and newspaper and fire insurance offices :

Loss by Lightning.

Date of storm.....190 ; hour of day .....M.
Where loss occurred .....Township.....Co.....
On whose premises ? .....
Kind of building struck ?.....
Of what constructed (wood, brick, or stone) ? .....
Kind of roof (shingle, slate or metal) ? .....
If building burned, how much loss ? ..... $ .....
Value of contents burned ?.....$.....
If struck and not burned, how much damage ? .....$.....
Was it provided with lightning rods ? .....
If so, what metal was used ? .....
What were the dimensions of the building ? Height.....length.....width .....
Was it isolated, or was it near trees, single or in groups ?.....
.....

Live Stock Killed in the Field.

Date of storm and locality .....
Kind of stock .....; number.....
Amount of loss..... $ .....
Was the stock near a wire fence ? .....
If near fence, were ground wires used ? .....
Was the stock in the open field ? .....
Was the stock under shelter of any kind ? .....
If sheltered, how ? .....

Trees Struck by Lightning.

Date of storm and locality .....
Kind of trees .....; number.....
Situation : Single, in group, or in forest .....
If grouped, relative height of tree, high or low.....
Nature and extent of damage.....
Name .....
Post Office Address .....

To be filled up and returned to Department of Paysics, O.A.C., Guelph, Ont.

The object in view was to discover if possible the conditions of liability to lightning stroke ; for persons and animals, in what circumstances of shelter there is least danger ; for buildings, what sorts of protection are efficient, especially as regards trees, lightning rods, and grouping of buildings.

In all 130 reports have been received, and the information conveyed is classified below.

TABLE I.—*Buildings struck and burned, wholly or partially.*

Circumstances.	Dwellings.		Churches.		Barns.	Stables.	Town Buildings.	Loss.
	Brick.	Frame.	Brick.	Frame.				
								$ c.
Isolated	.....	.....	1	.....	18	.....	.....	35,750
Near trees	.....	2	.....	.....	8	.....	.....	8,820
Near other buildings	.....	1	.....	.....	.....	1	1	2,400
Total	.....	3	1	.....	26	1	1	$46,970

Of the 32 buildings thus reported as burned, wholly or in part, four of the barns are reported as provided with lightning rods, and on two of these the rods were out of repair.

With regard to the two barns provided with lightning rods, additional information was obtained. The report given by Mr. A. King, Plattsville, whose barn was struck on May 2nd, is subjoined :

"The lightning apparently came down the rod nearly to the ground, and then left the rod and went through the wall two feet thick, shaking the foundation for several feet. Directly inside a row of cattle were lying. The stroke killed four head, two on either side where the bolt came through the wall. I dug down to see if the rod was in the ground a proper depth. The rod was put about one foot under ground at the wall, ran out about four feet and then went down several feet. I dug over three feet, and it was further down yet. When they put up the rod they made coil twist in rod to take up the spare length to get rid of it. I don't know whether that would affect current or not."

On June 12th, the barn belonging to Mr. Isaac Linton, Brooke Township, Lambton County, was struck and burned This barn had recently been provided with lightning rods. The Farmers' Sun made inquiry of the Insurance Co. and obtained a report, which we take the liberty of quoting here :

"The large barn of Isaac Linton, jr., lot 10, con. 9, Brooke, was struck by lightning and burned to the ground on the night of the 12th June last. The building had been rodded only a few hours previously—that is, on that day. The terminals of the rods were in water. The wires on the roof and sides of barn were held in place by an X shaped clip, the lower points of which were nailed to the roof and boards by ordinary nails, and the upper points closed around the wire. No insulating material was in this clip or around the wire, to prevent the electric fluid from leaving the wire and following clip and nails into the barn. The iron braces to upright rods were fastened to the roof in a similar way. Our Company has paid Mr. Linton his insurance, but we are not satisfied that this way of putting up lightning-rods is a safe way, and would like to have the opinion of others on it."—W. G. WILLOUGHBY, Walnut.

These two cases of rodded buildings being struck, although the rods were apparently in good repair, present certain features worthy of note. In the one barn, a *coil twist* had been made in the rod to take up the surplus length. There was also *a bend* in the same wire below ground, and near the wall. On the other barn, *no glass or other insulator* had been placed between the rod and the points on the building to which the rod was attached.

All these features cannot be too strongly condemned. I am confident that lightning rods, properly installed, afford a fair measure of protection. But so long as their installation is in the hands of uninstructed and irresponsible agents, lightning rods cannot be recommended with any degree of confidence. Every person, however, who decides to have rods placed on his buildings can act as his own inspector, and thus insure for his buildings some degree of protection. He should insist :

1. That there be not fewer than five points, terminals of the rods, on the building. The more the better. The points should be plated, or otherwise prevented from rusting.

2. That copper or iron rod be used. If copper, the rod should weigh about 6 ounces to the foot ; if iron, about 35 ounces to the foot.

3. That there be no sharp bends to the rod.

4 That all joints be thoroughly soldered.

5. That glass or other insulator be placed between the rod and the building at each point of attachment.

6 That the lower end of the rod extend into perpetually moist earth or water. The depth necessary to secure perpetually moist soil will depend upon the character of the soil and upon the locality, whether low or elevated.

7. That the ground end of the rod be spread out, broom-like, either by unravelling and separating the strands of the rod, or by attaching a number of branches.

8. Afterwards, that the rods be frequently inspected to see that they are in good repair in all the above particulars.

Of the total number of buildings, 86, reported struck during the season, the frequency for each kind of building is indicated below in percentage :

TABLE II. *Showing percentage of different kinds of buildings struck in 1901.*

Barns	with season's crop	43	
	empty	22	65
Stables			6
Isolated dwellings			17
Churches			5
Town buildings			7

65 per cent. of the total number of buildings struck were barns ; from Table I it may be seen that of the total number struck and burned, 80 per cent. were barns ; and of the total number of barns struck, 66 per cent. contained the season's crop.

These facts are of serious import. The barns, the storehouses of our wealth, appear to be specially liable to lightning stroke, and liable to total destruction in even a greater degree than other buildings ; and especially liable at that season of the year when the barns are filled with hay and grain.

With incomplete data at hand, it is perhaps premature to attempt to explain these serious facts. Still there are certain plain conditions that undoubtedly aid in effecting these results *First*, barns are nearly altogether built of wood, and therefore more likely to be burned if struck than buildings constructed of brick or stone. *Secondly*, barns are as a rule more isolated, and apart from trees, than other buildings. *Thirdly*, the crops of hay, grain, and straw filling the barns do in themselves, in all probability, afford by the heat and gases that they evolve, an inviting path for the lightning stroke. At the same time, the stored crops furnish at every point highly inflammable material to which a flash might set fire, and, therefore, a barn when struck is more liable to be burned if this inflammable material is at hand.

Protection of Barns from Destruction by Lightning.

This liability of barns to destruction is not altogether inevitable. With our present knowledge, the danger cannot be altogether avoided, but it can be lessened by certain precautionary and protective measures.

1. *Planting of Trees.* Trees, if too close to a building, may be a source of danger, on account of side flashes. Yet there is good reason for believing that trees, the more the better, serve to relieve the electric tension of the atmosphere in times of storm, even though no one tree may receive a destructive charge. In this case the charge is distributed harmlessly through numerous channels to earth, instead of being concentrated into one destructive flash, as happens when a single isolated object receives the charge. For the same reason, groups of buildings are mutually protective.

2. *Lightning Rods.* The evidence afforded by our reports is negatively in favor of lightning rods. We have at hand no data in regard to the proportion of barns in Ontario that are provided with rods. Therefore, we cannot pronounce upon the relative security of barns so provided. But, as has already been stated, only four rodded barns were struck ; of these, two of the rods were out of repair ; and in the erection of the other two the ordinary rules of safety were disregarded. If lightning rods are put up, not according to the fancy or the convenience of the agent who sells them, but in a manner approved by a properly-instructed and impartial person, they will afford not absolute security, but a reasonable measure of protection. In fact, barns especially, with their excessive liability to lightning stroke, should be provided with some form of protection.

In the erection of galvanized iron eave troughs on a barn, these troughs might well be utilized as lightning conductors. They would require to be connected with care, insulated from the building, (which they should be in any case), and continued into the cistern or connected by wire to moist earth.

TABLE III. *Stock Killed.*

Circumstances.	Horses.	Cattle.	Sheep.	Hogs.	Value.
Under Trees. Maple		1			$ 40
Pine		1			50
Elm	1	2			190
Poplar		1			65
Beech	1 (tree not struck)				40
Orchard		1 (calf)			10
Not specified	3	12	6		765
By straw stack				1	10
Near water pipe from barn		1			45
In shed	2				140
In basement stable		5			153
Near wire fence		1			40
Near rail fence		1			150
Without shelter	4	7	1		532
Total	11	33	7	1	$2,230

Trees Struck.

Kind and Number of Trees.							Situation.	Nature and Extent of Damage.
Pine.	Elm.	Basswood.	Hemlock.	Maple.	Oak.	Chestnut.		
3							Isolated	1 slightly damaged. 1 smashed. 1 burned and splintered
2							In clump	Not specified.
2							In forest	Split and killed.
1							15 rods from barn	Not specified
	6						Isolated	4 not specified. 1 destroyed. 1 large branch torn off
	1						In clump	Not specified.
		2					Isolated	Not specified.
		2					Standing together in open field	1 cracked. 1 completely shattered.
		1					In forest	Not specified.
			2				On edge of forest	Not specified.
				2			Isolated	1 destroyed. 1 not specified.
					1		Isolated	Splintered, bark peeled.
						1	Isolated	Splintered.
8	7	5	2	2	1	1		

Reports from the United States emphasize the danger of wire fences. There is doubtless danger from this source, although the above figures do not emphasize it. This may be because of the fact that there are relatively fewer wire fences in Ontario, the old rail fence not having been supplanted as yet. This form of danger can be lessened or prevented. An animal standing near a wire fence during a thunder storm may receive a charge, because the fluid finds the easiest path to the ground through the body of the animal. Such would not be the case if the strands of the fence were connected by ground

wires to earth. At intervals of 400 or 500 feet a wire should be clamped closely to the several strands of the fence and run into the ground several feet as a lightning rod would be. This plan is simple and inexpensive, and should be adopted on all wire fences.

Persons Struck

Number.	Circumstances.	Extent of Injury.	Remarks.
1	In yard, under wire clothes-line	Killed	Sidefla h from wire to nose
4	In house	Slightly injured	
1	On hay-rake in field	Killed	
2	In open field carrying hoes	1 killed Other slightly injured	
1	Undertree	Killed	
2	In porch of church	One killed, the other stunned	
11			

Cold Storage.

Last year a model Cold Storage House, after the Hanrahan system, was erected at the College. During the year, the Dairy and Poultry departments have made use of the refrigerator for experimental purposes At my request, account was kept of the amount of produce stored and of the temperatures of the different articles when placed in cold storage. Also, a daily record was kept of outside and inside temperatures. At the end of the season the amount of ice consumed and the amount of refrigeration performed being known, a factor has been obtained stating the effectiveness of the walls of the ice-house in excluding the external heat. This factor is called the radiation co-efficient, and is obtained as follows:

Radiation through walls of Cold Storage House. First, the amount of ice required to cool the products stored was calculated.

For the butter and cheese stored during season	1,730 lbs.
For the poultry and eggs stored	138 "
Total	1,868 lbs.

The latter amount was subtracted from the total number of pounds of ice consumed during the season, 126,720, giving a remainder of 124,852 pounds This amount of ice was consumed by the heat radiated through the walls, and depends upon three conditions:

1. The total areas of the walls, floor, and ceiling of the ice-house and refrigerator. (See plans, Figs. 2 and 3)
2. The difference between the outside and inside temperatures.
3. The character of the walls, floor, and ceiling with respect to insulation.

Suppose the walls were of such a character that a unit of heat (the amount of heat required to raise 1 pound of water 1 degree in temperature) would pass through each square foot of wall surface in 24 hours for each degree of difference between outside and inside temperatures; then if A be the total areas of the walls, floor, and ceiling, and D be the difference between the outside and inside temperatures, the amount of heat radiated through the walls inward in 24 hours would be $A \times D$; hence the number of pounds of ice consumed by the heat would be $\frac{A \times D}{142}$, since to melt 1 pound of ice requires 142 units of heat; and if this factor, $\frac{A \times D}{142}$, were calculated for each 24 hours of the season, and the results added, we should have a number expressing in pounds the amount of ice consumed for the season, with a unit coefficient of radiation. Dividing this number by the amount actually consumed would give us the true coefficient of radiation. For the refrigerator, for the season.

$$\frac{A \times D}{142} = 14{,}640 \text{ pounds of ice.}$$

For the ice-house

$$\frac{A \times D}{142} = 41.317 \text{ pounds of ice}$$

Total 55,957 pounds of ice.

The total number of pounds of ice consumed by this means was, as above stated, 124,852 ; therefore, the radiation coefficient $N = \frac{124{,}852}{55{,}957} = 2.23$.

This factor holds true for all buildings, large or small, built after this pattern. Hence, by means of this factor, it is easy to calculate the amount of ice required to keep a refrigerator of given dimensions going, allowing of course a small percentage for cooling the products stored.

It may be noticed that of the total amount of ice consumed, only 1.5 per cent. was consumed in cooling the products stored ; all the rest was used up, practically wasted, by the heat from the outside. If a wall had been constructed in this instance that would allow no heat to pass through, only one ton of ice, instead of over 60 tons would have been required. Hence the *economy of good insulation*. Much less ice is used where insulation is good.

Not only that. I visited this year a refrigerator cooled by ice where the temperature was held between 34 degrees and 36 degrees through the entire season,—3 degrees or 4 degrees lower than the temperature in the refrigerator here. The difference is a matter of insulation. The insulation of the College Cold Storage is *good* ; that in the other to which I refer is *better*. On the other hand, the latter costs more in building.

Circulation of air in Cold Storage. Many refrigerators are well insulated, and provided with plenty of ice, but have little or no provision for air-circulation. There are two methods of cooling or refrigerating a room, as well as of heating. A room may be heated by radiation from a steam or hot water radiator : or it may be heated by bringing warm air into the room and allowing the cold air to pass out. Similarly a room may be cooled by placing ice in a box within or above the room or by placing therein pipes carrying some refrigerating substance ; that is, by radiation ; or it may be cooled by bringing cold air into the room and allowing the warm air to pass out.

For refrigeration, air circulation is better for many reasons than radiation. Those who have built cold-storage houses in recent years have been aware of the advantages of air-circulation, but many have been ignorant of the principles. In cases where principles of circulation are disregarded, the circulation is defective, and poor results have been obtained ; consequently, cold storage has been discredited, when a few slight changes in the details of the building would have given satisfactory results.

The Diagram I. (Fig. 1), shows the improper method, too often found, of providing for air-circulation between the ice storage above and the refrigerator below. It will be observed that there are spaces left between the walls and the floor of the ice chamber, through which the air is expected to flow. But the question is, which way will the air flow, from left to right, or from right to left? The air must flow down through one space and up through the other, or else there will be opposite currents meeting and conflicting. As there is nothing in the construction of the building to give a definite direction to the air-currents, the air will move sluggishly, or not at all.

It is well known that when moisture-laden air comes into contact with a cold surface, the moisture is condensed on that surface in the form of minute drops.

This happens in a refrigerater when the air, laden with moisture from the fruit, butter, cheese or meat stored in the room, touches the cold ceiling beneath the ice-chamber. Moisture is condensed on the ceiling, and hence the objectionable "dripping" so common in refrigerators.

Various devices are resorted to in order to prevent this dripping. Sometimes lime is scattered over the floor or salt of some kind kept in pans or troughs in the room, to absorb the moisture. In a room cooled mechanically by expansion pipes placed in the room, the moisture condenses on the pipes. If the pipes are cold enough, the deposit is in the form of hoar frost, which gathers about the pipes until a thick coat is formed, interfering with the cooling effect of the pipes. Then, if the machinery stops or the room warms up, the frost on the pipes melts, and the articles stored are deluged with the drip.

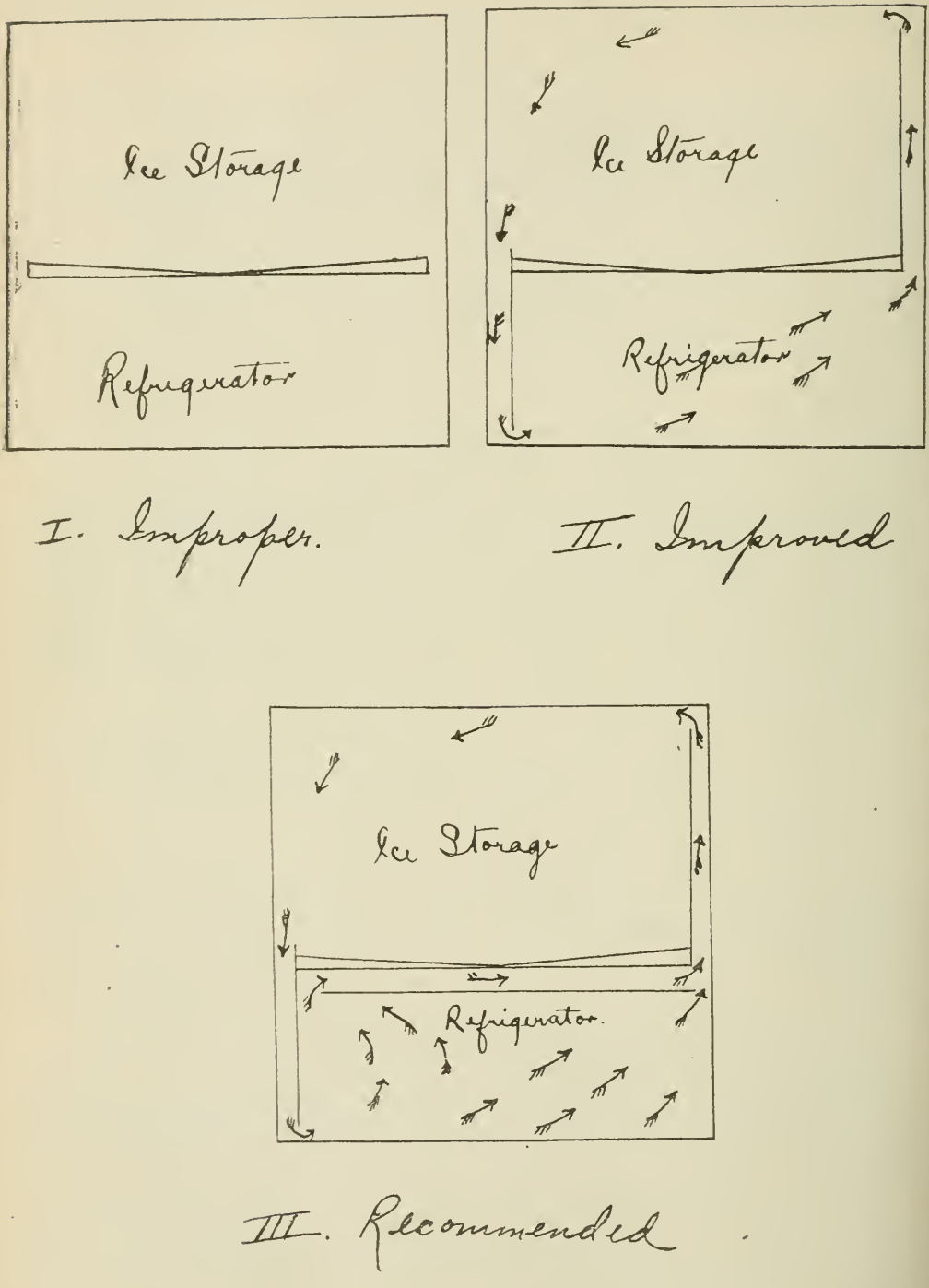


FIG. 1.—Diagrams showing proper and improper methods of providing for air-circulation in refrigerator.

Diagram II. showing an improvement over I. In II. a passage open at top and bottom, extends in depth from the floor of the ice-chamber to a point near the floor of the refrigerator, and in width across the side of the refrigerator. On the opposite side a similar passage extends from the ceiling of the refrigerator nearly to the ceiling of the ice chamber. The cold air comes down the first passage and the warm air leaves the refrigerator by the second. The suggestion for this plan of air-circulation is drawn from Nature, for it is a partial imitation of the convectional circulation of the atmosphere, which causes winds.

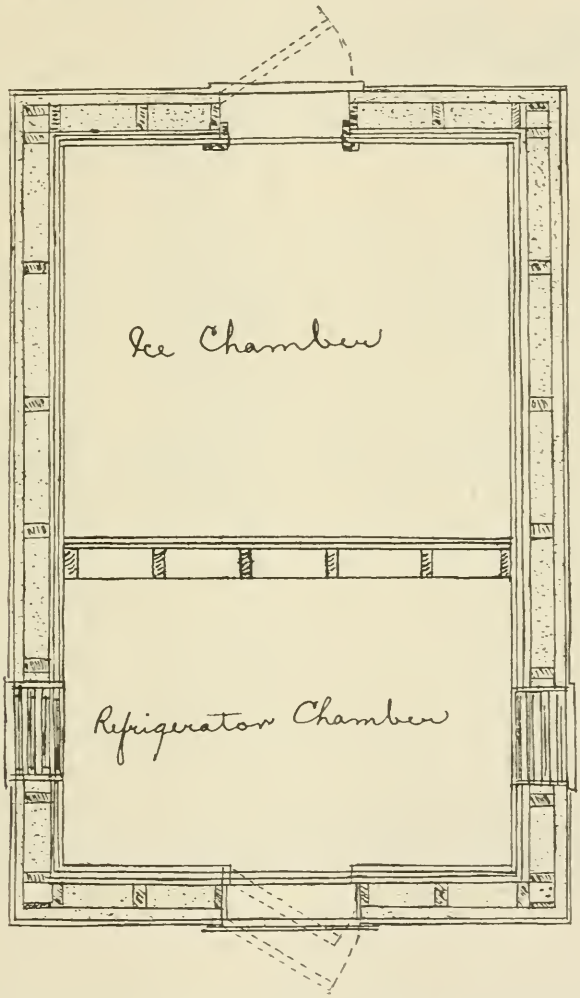


FIG. 2.—Horizontal plan of Hanrahan's cold storage, showing insulation.

Plan II., however, is imperfect in its results. By this plan, the air in the upper left hand corner is stagnant. To prevent such stagnation, a false ceiling is constructed, shown in III, by the aid of which an exit is provided for the warm air on both sides of the refrigerator, and the circulation becomes more complete.

The effect of this circulation is two-fold ; first, the moving air does not deposit its moisture in the refrigerator, but carries it up to the ice chamber where the moisture is condensed on the ice. Hence, the *air* of the refrigerator is *much drier* with circulation than without. Secondly, the spores that cause mould are carried along with the moist air, and deposited with the moisture on the ice, and carried off with the meltage So that with circulation the number of spores in the air of the refrigerator is much lessened ; and

in addition, those that remain are, on account of the dry air, less likely to develop and form mould.

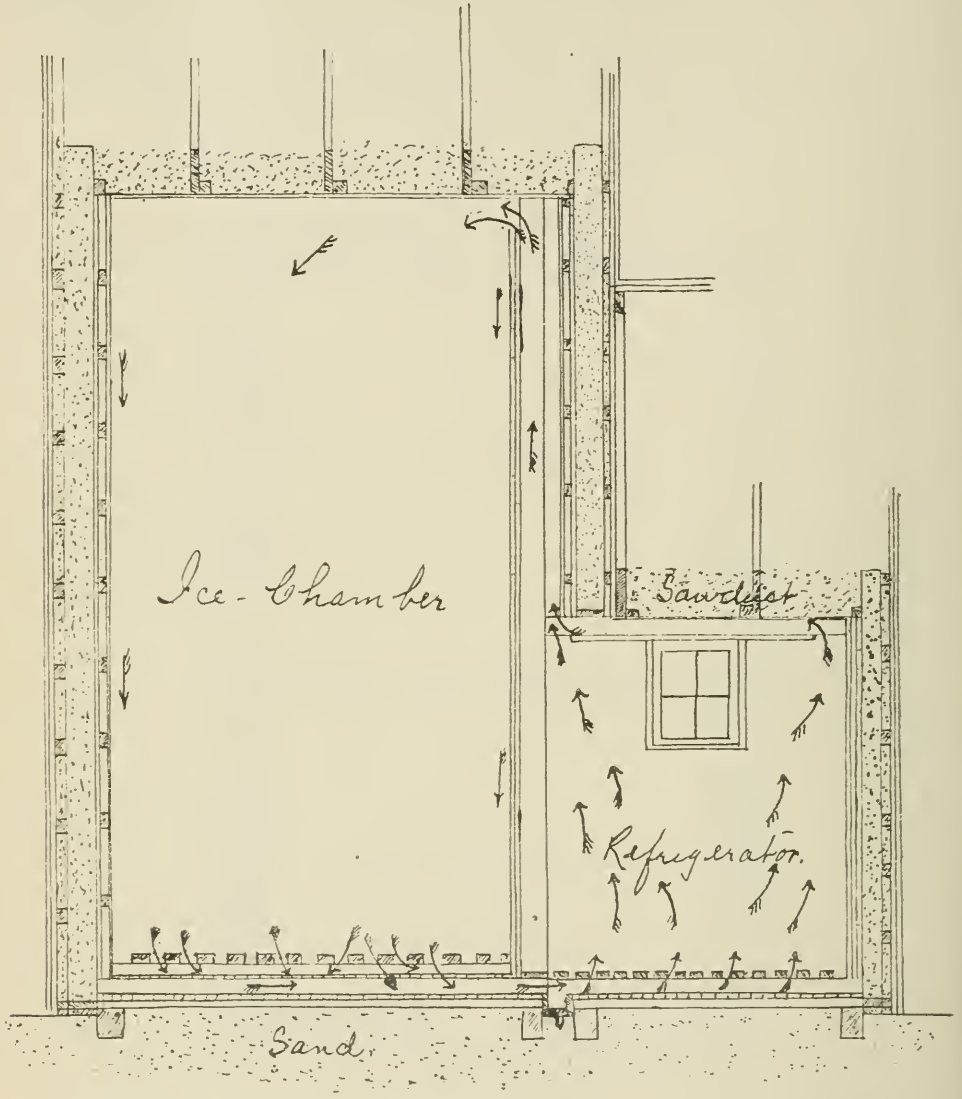


FIG. 3.—Vertical plan of Hanrahan's cold storage, showing insulation and air-circulation.

Hence, by a good system of air-circulation, two very undesirable conditions in a refrigerater are prevented or reduced to a minimum, viz, *dripping* and *mould*. It is probable also that some odorous gases given off by the products in the refrigerator are absorbed at the surface of the melting ice. So that a refrigerator provided with a good system of circulation is supplied with *cold* air *comparatively dry* and *pure*.

What Cold Storage cannot do. It is just as important to know what cold storage cannot do, as to know what it can do. Large quantities of valuable food-stuffs have been destroyed this year by placing them in cold storage with unfavorable surroundings. For instance, the refrigerator at the College was, by the order of the inventor of the system, sheeted inside with pine lumber, when spruce should have been provided, as odorless. The inventor claimed that by means of the excellent system of air-circulation all "moisture, odors, and gases" are removed from the storing-room.

But the odor of the pine was not so removed, and consequently the cheese and butter placed in storage at the beginning of the season was strongly flavored with pine. Again, later in the season, a large quantity of warm dressed poultry was stored in the refrigerator, and 24 hours afterward the room smelt like a poultry yard.

As a matter of fact, no system of cold storage, not even the best, can remove such odors and taints as these. In storing sensitive food-stuffs, such as eggs, butter, and cheese, the only safe course is to keep them entirely separate from strong-smelling stuff, such as onions, cabbage, or even tainted products of their own kind.

Further, cold storage is *not a curative* process. If goods, before being stored, are damaged or decayed, the best that can be done is to check or postpone decay.

A very important factor in the success of cold storage is the condition of the product stored. To make cold storage really worth while, the produce, whether meat, fruit, butter, or eggs, should be fresh, sound, and free from taint. Otherwise, the taint, the disease, or the bad flavor will generally develop and spread even at low temperatures, although more slowly than at normal temperature.

Experiments in Cold Storage of Fruit.

Following the suggestion of some prominent fruit-growers, this department has undertaken a series of experiments in cold storage of fruit, principally apples and pears. The objects of the experiment are to discover the best temperatures for holding the various kinds of fruit; also to discover the best methods of packing fruit for long storage.

For these purposes twenty boxes of Duchess pears have been packed by Mr. A. W. Peart, B.A., of Burlington, and two barrels and eight boxes of Snow apples by Mr. W. H. Dempsey, of Trenton. This fruit, both pears and apples, have been packed in duplicate, there being two boxes of each kind packed in the same way.

Hence, there are two lots of pears, ten boxes in each lot, one lot being held at a temperature of 33 degrees, and the other lot at a temperature of 40 degrees. This part of the experiment will demonstrate which is the better temperature for holding pears.

In each lot of ten boxes there are two grades of pears; one being the Imperial or large grade for shipment to England, and the other the Selected, the grade next to the Imperial in size. The experiment thus will test the comparative suitability of these grades for long storage.

The preceding subdivision of the ten boxes gives five boxes in a group for comparison of modes of packing. These modes are as follows: pears only; pears, with excelsior top and bottom; pears, wrapped in tissue paper, with excelsior top and bottom and between the layers; pears wrapped in oil paper, otherwise same as previous; lastly, same as the third except that the box is lined inside with heavy paper making it practically air-tight. In the first four boxes there are openings between the boards for ventilation.

The apples are packed and stored according to a similar plan. It will be some time before any of the fruit will be reported upon. If definite conclusions can be reached from these initial experiments, a report of the same may be looked for in due time. It is intended to follow these experiments next year with a more extensive series.

Ventilation of Farm Stables.

Figures 4 and 5 show a plan of the ventilation that has been placed in our farm stables this year. Fresh air is brought into the stables from the roof by means of two pipes. These pipes are terminated at the peak of the roof by revolving cowls similar to those shown in Fig. 4 They are 30 inches in diameter, and furnish a combined inlet of about 10 square feet. They are connected below with wooden boxes that carry the air down through the barn to the ceiling of the stable, to the points marked I, Fig. 5. From these points, boxes extend along the ceiling to the floor, and along the floor of the mangers. In front of each stall in the passage a 4-inch opening is cut in the box, to let the fresh air into the passage.

The fresh cold air thus enters for the most part at the floor. The foul air passes out from the ceiling at the points marked O, by means of pipes leading from the ceiling of the stable to the roof of the barn. It is intended to carry these outlet pipes through the roof and terminate them by a roof-like top, in order to protect them from wind and rain. As yet, however, this has not been done, the outlet pipes terminating at present just below the roof of the barn.

This plan of ventilation has not been in operation long enough to afford a complete test. It has so far been quite effective. The tinsmiths, however, in constructing the re-

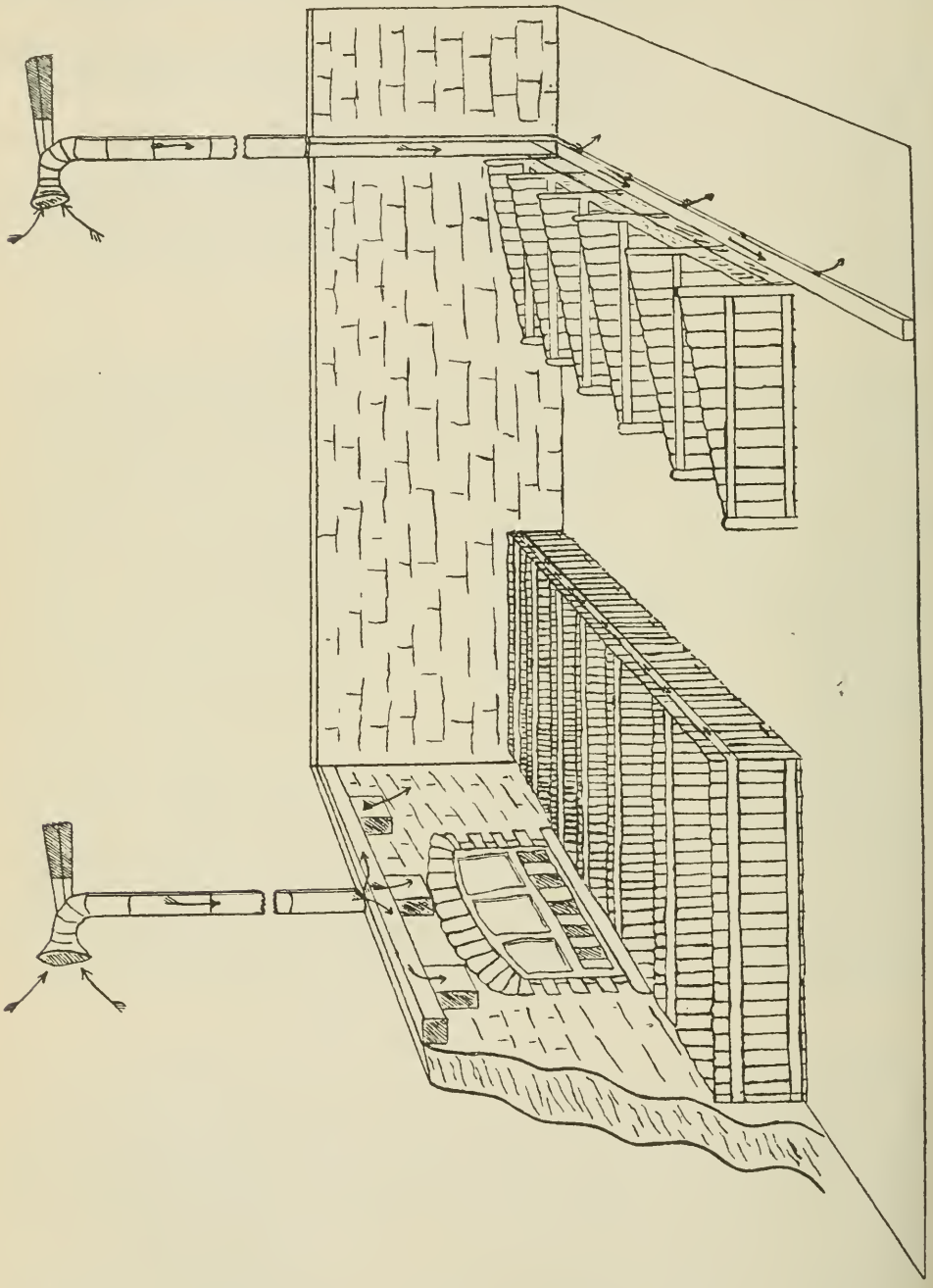


FIG. 4.—Showing fresh air brought in, in part at the floor, and in part at points between floor and ceiling. A system adapted to stables already built.

volving cowls, built them too light. The fan-tail that operates the cowl is attached to the cowl by rods, and these are not sufficiently heavy. I observe that one of the tails has been torn off by the wind, and consequently one end of the stable is without ventilation.

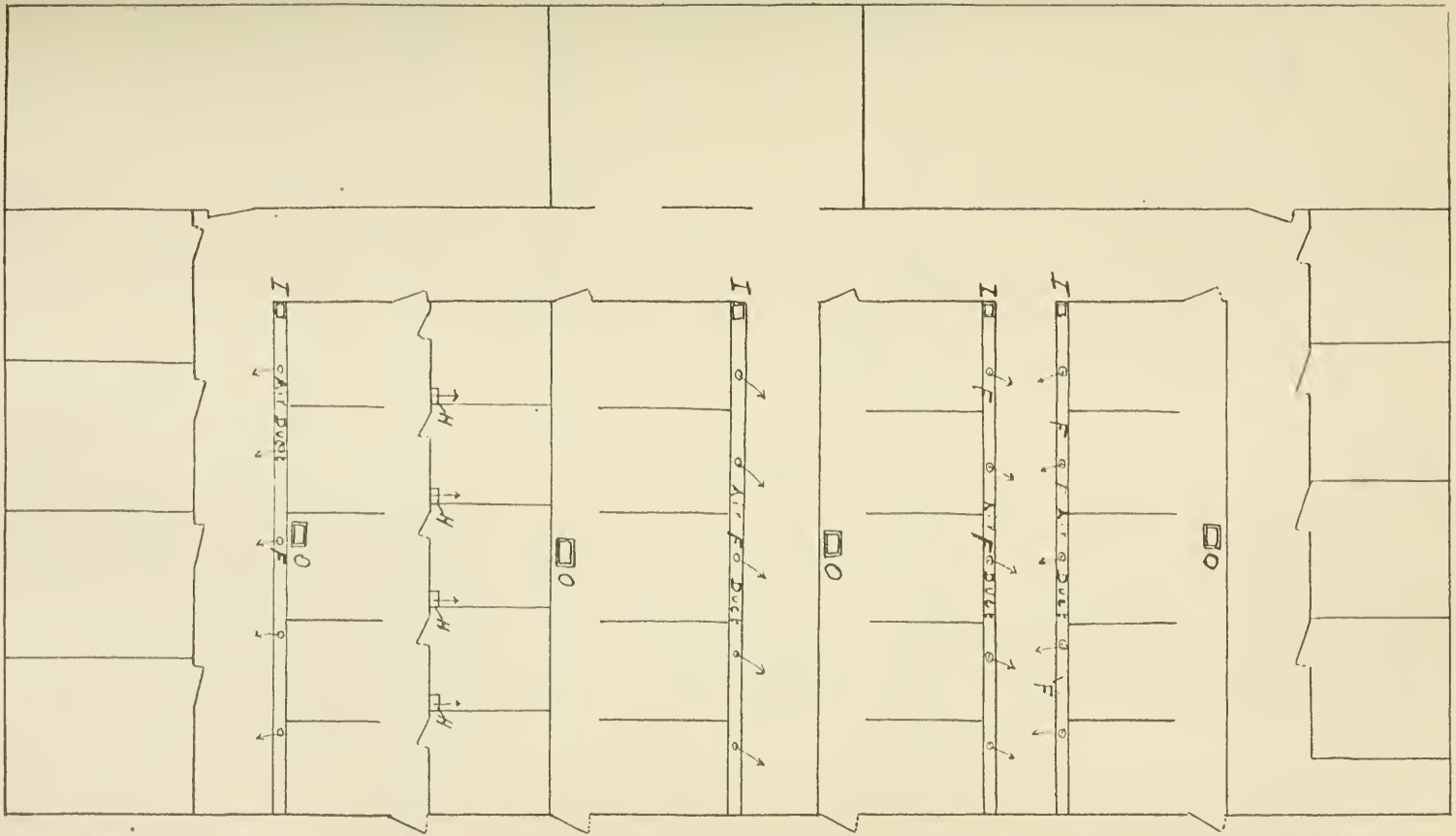


FIG. 4.—Showing Ventilation of Farm Stables. I, points where the air is brought to the stable from above; F, inlets at the floor in front of stalls; H, inlets to box stalls, half-way down from ceiling; O, outlets at ceiling.

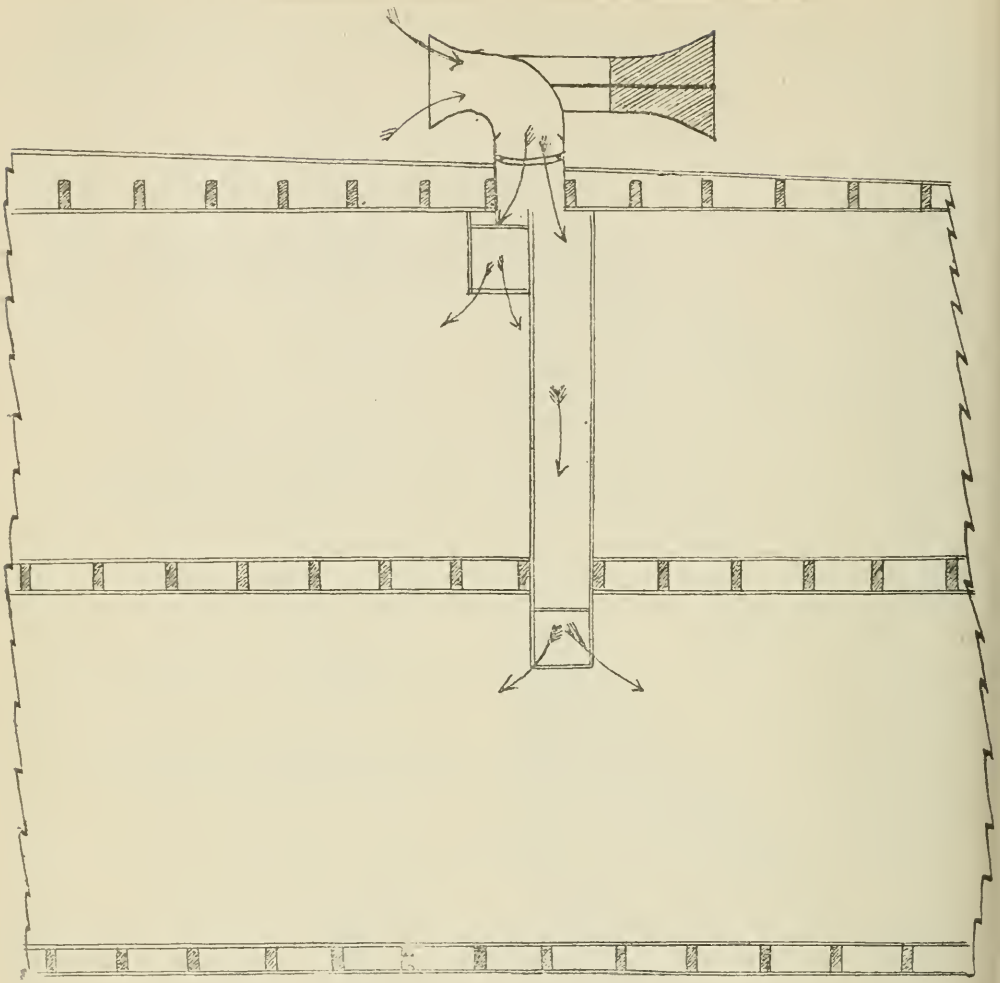


Fig. 6.—Section showing ventilation of part of College Residence.

When both cowls are working, it is very evident that fresh air is entering into the stable in considerable quantities The dangers to be guarded against are : a temperature too low, and a condensation of moisture in the outlet pipes and consequent dripping. Before the present system was introduced, there were ventilating pipes, ten of them, running from the ceiling of the stable to the roof of the barn, and connected with the louvred ventilators at the top. These pipes were intended to carry off the foul air. In winter, however, it was found that these pipes often conveyed dangerous down-draughts into the stable. When they acted as they were intended to do, and carried off the foul air, the moisture contained in the outgoing air condensed on the boxes at their upper end, and kept up a continual dripping. The result was that the lower ends of the pipes were kept stuffed with straw all winter, and they were practically of no use. In our present system, we have utilized five of the old pipes for inlets, and the remainder for outlets. As yet, there has been no sign of dripping, and it is expected that the brisk movement of air in the stable, an important factor in this system of ventilation, will carry the foul air out of the pipes before condensation can take place.

With regard to the chance of the temperature becoming too low, we have provided against this by placing shut-offs in the inlet pipes, at the ceiling. These shut-offs are operated by cords ; and, if there is danger at any time of the stable becoming too cold, a simple pull of the cord will shut off, partly or completely, the supply of fresh air.

A similar system has been introduced for ventilating the part of the College residence that has recently been fitted up. As shown in Fig. 6, the air from one cowl is carried to two flats by utilizing the spaces between studdings in the partition. The fresh air enters the corridor at the ceiling, and from the corridor finds its way into the rooms, on each side, through a permanent opening in the fan-light, provided expressly for this purpose. Each room is also equipped with a foul-air register in the side wall, near the floor, on the opposite side of the room from the fan-light. The foul air is carried up between studs in the wall to the garret and thence to the outside by means of ventilators in the roof.

Seventeen rooms on each flat, thirty-four rooms in all, are thus supplied with fresh air by three 15 inch cowls. It is impossible to give at present any experimental results as to the efficiency of the new system.

REPORT OF RAINFALL AND TEMPERATURES DEC. 1ST, 1900 TO DEC. 1ST., 1901.

Month.	Temperatures.				Precipitation.		
	Maximum.		Minimum.		Rain.	Snow.	Total in inches of rain.
	Degrees.	Date.	Degrees.	Date.			
December	49.0	3	— 4	14	.465	2. 4	.705
January	41.0	9 and 21	—14	19	.930	14.70	2. 40
February	31.0	26	— 7	24	.....	9 75	.975
March	47.5	19	— 3	7	.450	9 25	1.375
April	77.0	30	27.0	1	1.710	5.25	2.235
May	75.0	6	32.0	15	3.255	....	3.255
June	92.4	23	35.0	9	1.525	. ....	1.525
July	94.2	2	50.2	9	4.065	.....	4.065
August	88.2	15	46.5	2 and 9	3 510	.....	3.510
September	86.2	7	33 5	19	2.445	....	2.445
October	69.2	2	23.5	25	3 367	.....	3.367
November	63.0	1	11 0	28	1.885	3.75	2.260
For 1901	94.2	July 2	—14	Jan. 19	23.607	45.10	28.117
" 1900	96.0	Aug.6	—14	Feb. 26	20.011	61. 7	26.181

Number of days of sleighing:—January, 17 ; February, 28 ; March, 22. Total, 67 days, compared with 70 days in 1900.

Respectfully submitted,

J. B. REYNOLDS,

Professor of Physics.

PART III.

REPORT OF PROFESSOR OF BIOLOGY AND GEOLOGY.

To the President of the Ontario Agricultural College :

SIR,—I have the honor of presenting herewith my fourth annual report on the work of the Biological Department.

It is with a feeling akin to relief that I view the new Biological building now nearing completion, for with the great increase in the numbers of students in the last three or four years, our laboratory accommodation and equipment have become altogether inadequate. It is simply impossible for the students to do good work, or for the instructors in charge to direct the work satisfactorily. Notwithstanding the inconveniences under which we have labored, I have pleasure in stating that much valuable work has been accomplished. More attention than ever before has been given to individual laboratory instruction, so that every pupil has come into direct contact with the plants and insects which he has been studying. Certain investigations, entered upon last year, were continued and completed, while others were begun. Much information was given to the public in the form of bulletins, and articles published in the agricultural press, as well as by correspondence with persons who made direct inquiries by letter.

THE NEEDS OF THE BIOLOGICAL DEPARTMENT.

With the erection of the new laboratories, one of the most pressing needs of this department is disposed of. I beg, however, to call your attention to the other things which are absolutely necessary if the instruction in botany, entomology, zoology, and geology is to be of a practical character and of permanent value :

1. An Insectary, for the study of life-histories of insects.
2. New microscopes for the use of the third and fourth year classes.
3. Apparatus for practical work in plant physiology and the culture of fungi.
4. More assistance, so that investigation work may be carried on in the study of injurious insects and plant diseases. With the introduction of the Nature Study course in April, May, and June, no time will be left the regular officers of this department to conduct systematic investigations along these lines.

CLASS-ROOM AND LABORATORY INSTRUCTION.

A re-arrangement of the courses became necessary at midsummer, owing to the promotion of Mr. M. W. Doherty to an associate professorship, and the appointment of Mr. T. Jarvis, B.S.A., as helper. In this new arrangement of the courses I retained all the physiological botany, fungi and plant pathology, entomology and geology, while to Assoc.-Prof. Doherty was assigned the systematic histological and structural botany of all the years, and the zoology of the first and fourth years.

Under this new arrangement the work has thus far gone on smoothly ; besides, I am relieved very much from the taxing burden of lecturing as frequently as formerly to large classes, as a portion of this burden is now borne by Assoc.-Prof. Doherty.

Following is a brief synopsis of the courses given in 1901 in botany, entomology, zoology and geology :

BOTANY, FIRST YEAR. (a) Field excursions, where the student familiarizes himself with the names of the common wild plants, learns their manner of growth, and the way the fruits and seeds are produced and disseminated ; (b) laboratory studies of the entire plant, including root, stem, leaves, and fruit ; and (c) lectures summarizing and illustrating the practical work, by Assoc.-Prof. Doherty.

BOTANY, SECOND YEAR. (a) Laboratory study on the morphology of plants, and their classification ; a critical study of weed seeds, and an elementary course in the study of grasses and fungi ; (b) lectures (two every week) on the morphology, classification, and physiology of plants, by Prof. Lochhead and Assoc.-Prof. Doherty.

Botany, Third Year. (a) Laboratory and lecture courses in systematic botany, including grasses, by Assoc.-Prof. Doherty ; (b) Laboratory and lecture courses in fungi and plant pathology, by Prof. Lochhead ; (c) Lecture course in plant physiology by Prof. Lochhead.

Botany, Third Year, Specialists in Horticulture. A laboratory and lecture course in plant histology, by Assoc.-Prof. Doherty.

Botany, Fourth Year. (a) Laboratory and lectures courses in systematic botany, by Assoc.-Prof Doherty ; (b) laboratory and lecture course in fungi and plant pathology, by Prof. Lochhead.

Entomology, First Year. A short course of four lectures on insect life was given to the first year students, the object being to show the great economic importance of the subject. These lectures also embraced something on methods of collecting and preservation, and on the life histories of a few common insects, such as the housefly, mosquito, squash-bug. and cabbage-butterfly, by Prof. Lochhead.

Entomology, Second Year. This course of thirty-five lectures and demonstrations is made as practical as possible with the laboratory accommodation at our disposal. The chief insect pests of the farm, orchard, and garden are discussed and studied, by Prof. Lochhead.

Entomology, Third and Fourth Years. This course, consisting of lectures and practicals, deals with both beneficial and injurious insects, and is a continuation of the second year course. Here, the students become acquainted with the literature of the subject ; by Prof. Lochhead.

Zoology, First Year. So far, this course, owing to lack of room, consists entirely of lectures and demonstrations, thirty in all. The chief animal types from the Amoeba to the Mammals are discussed at some length.—Professors Lochhead and Assoc.-Prof. Doherty.

Geology, First Year. A course of thirty lectures and demonstrations dealing with the common minerals and rocks, the chief agencies operating in the formation of soils, and the geological history of the rock formations of Ontario, by Professor Lochhead and Assoc.-Prof Doherty.

Geology, Third Year. This course is a continuation of the first year course, but it is of a more practical nature, because the class is smaller. Considerable attention is given to the formation of soils through glacial action ; and the geological history of North America is studied, with special emphasis on the Canadian region, by Prof. Lochhead.

Heretofore, through lack of accommodation and help, no laboratory instruction has been given first year students in zoology and geology; but it is our purpose to make a beginning of laboratory work in these subjects this coming year, for lectures without practical work are of little value.

Outside Work.

During the year, many calls were made upon this department for assistance and advice with regard to injuries caused by insects, fungi, and weeds. In May, two weeks were spent in the south-west counties in a study of the habits of the Hessian Fly, the object being to find out the best methods of dealing with this destructive insect. A visit was made to Galt in June to confer with the civic authorities there as to the best means to adopt in preventing the ravages of the American Tent Caterpillar ; and an outbreak of Rose-chafers in two peach orchards near Niagara-on-the-Lake necessitated a trip to that district.

As Inspector of Fumigation Appliances, I visited many of the nurseries east of Toronto, and in the Niagara district.

In April, I delivered an illustrated lecture on " The Care of Shade Trees," before a joint meeting of the Hamilton Horticultural Society and the City Improvement Society in the Y. M C. A. Building, Hamilton.

Believing that the introduction of Nature Study into our Public Schools would not only be of great educational value, but also be a means of stimulating the young people of our rural districts to take an increased interest in farm life, I gave several addresses before Teachers' Associations on the aims of Nature Study, and the best methods of teaching this very important subject.

The introduction of Nature Study into the Third Year course of this College will, in my opinion, have far-reaching results. Every graduate will not only exert a strong, active influence in favor of the study of Nature, but will also, in virtue of his knowledge of the subject, gained at the College, be able to bring the matter forcibly before the public in his addresses at Farmers' Institutes and other meetings. In fact, a new and powerful impetus will be given to one of the greatest educational movements of the day,—a movement which has for its chief aim : "To cultivate the child's power of observation, and to put him in sympathy with out-door life."

Bulletins, Reports, and Articles Published during the Year.

During the summer, I prepared a bulletin on "The Hessian Fly in Ontario," which embodied the results of my studies made earlier in the year. This bulletin was published by the Department of Agriculture, Toronto, and distributed before fall wheat seeding-time to the farmers of the infested areas.

A newspaper bulletin on "Grain Rusts" was published in August, on account of a wide-spread desire for information regarding this fungus, which was prevalent and injurious in many sections of the Province. I have thought it advisable to incorporate the bulletin in this report, as it contains in a concise and popular form the latest results and conclusions of the most recent investigations.

In February, I presented my second annual report as Inspector of Fumigation. This report was printed as part of the Report of the Minister of Agriculture for Ontario.

In early spring, I prepared a circular on the "Treatment of Smuts," which gives concisely the best methods of treating oats and wheat for the prevention of smut. The contents of the circular were published in some of the agricultural papers of the Province.

At the annual meeting of the Entomological Society of Ontario held in London, November 13th and 14th, I read the following papers : (1) "The Injurious Insects of the season of 1901," (2) "The Hibernation of Insects," and (3) "Nature Study Lessons on Mosquitoes." These papers will appear in the forthcoming annual report of the Entomological Society.

The following articles on Injurious Insects, Weeds, and Fungi were contributed to the Press :

Crude Petroleum Experiments Against the San José Scale (*Canadian Horticulturist*).
Recent Books on Mushrooms and Toadstools (*Canadian Horticulturist*)
Peach Yellows (*Canadian Horticulturist*)
Protection of Shade Trees in Towns and Cities (*Canadian Horticulturist*).
The Original Home of the San José Scale (*Canadian Horticulturist*).
Spraying (*Canadian Horticulturist*).
The Buffalo Tree-Hopper (*Canadian Horticulturist*).
More About the San José Scale (*Canadian Horticulturist*).
Some Raspberry Pests (*Canadian Horticulturist*).
An Abnormal Growth on the Scotch Pine (*Canadian Horticulturist*).
The Quarantine of American Fruits in Germany (*Canadian Horticulturist*).
Treatment of Corn Smut (*Farmer's Advocate*).
The New Peach Pest (*Sun and Globe*).
The Hessian Fly Again (*Farmer's Advocate*).
Black Rot of Grapes in Essex (*Farmer's Advocate*).
Some Useful Friends (*Guelph Mercury*).
Ants, Buffalo Carpet Beetles, and Clothes Moths (*Guelph Mercury*).
The Plum Curculio (*Guelph Mercury*)
The Flying Boring Bug (*Farmer's Advocate*).
Round-Leaved Mallow (*Farmer's Advocate*).

Injurious Insects and Fungous Diseases.

The season of 1901 was decidedly favorable for the development of plant diseases induced by fungi. The number of injurious insects was as large as that of 1900, and much injury was wrought by the Hessian Fly, apple-tree Borers, Plant Lice, San José Scale, Oyster-Shell Bark-Lice, Scurfy Bark-Lice, and other common insects.

In the matter of spraying, much ignorance still exists regarding the proper materials, and the right proportions of the materials to use against the different insects and fungi. All this kind of information is given in a special bulletin published by the Department of Agriculture, entitled "Insects and Plant Diseases;" but I shall take the liberty of re-stating some of the common formulae for both large and small quantities :

Paris Green Mixture—for leaf-eating insects :

Paris Green	1 lb.	or	1 teaspoonful (level).
Water	200 gals.		1 pail (2 gals.).
Lime (fresh)	1 lb.		1 teaspoonful (level).

Hellebore :

White Hellebore	1 oz.
Water	2 gals.

Insect Powder :

Pyrethrum	1 oz.
Water	3 gals., to be sprayed on the leaves.
Pyrethrum	1 part.
Flour	4 parts, to be dusted on plants.

Whale-oil Soap, for plant-lice and bark-lice :

Whale-oil Soap	1 lb.
Water	7 gallons.

Kerosene Emulsion, for bark-lice and plant-lice :

Coal oil	2 gallons.
Soft water	1 gallon.
Soap	1-2 lb.

Dissolve the soap in the boiling water, then add the coal oil, and churn briskly for 5 minutes. Before using, dilute with 9 parts water.

Combined Paris Green and Bordeaux Mixture, for fungi and biting insects :

Blue Vitriol	4 lbs.	or	4 tablespoonfuls (level).
Quick Lime	4 lbs.		4 tablespoonfuls (level).
Paris Green	4 oz.		1 tablespoonful (level).
Water	40 gall.		1 pail (2 galls).

In a paper read at the annual meeting of the Entomological Society of Ontario in November, I gave a brief account of the Injurious Insects of the Year, which came under my notice. Some of the insects there discussed are : *The Potato-Stalk Borer* (Trichobaris trinotata), which injured the potato crop of Pelee Island ; the *Rose-Chafer* (Macrodactylus subspinosus), which damaged the peaches in two orchards near Niagara-on-the-Lake ; the *Asparagus Beetles* (Crioceris asparagi and C. 12 punctata), which appeared for the first time on the asparagus plants at the College ; the *Cherry Aphis*, (Myzus cerasi), which did considerable injury to the cherry trees in the Niagara peninsula ; and *Bush Fruit Insects*.

I also called attention in that paper to the utter worthlessness of the Haseltine Trap Lantern as a Codling Moth catcher. In my experiments, carried on during the summer, not a single Codling Moth was caught ; while 74 per cent. of all the insects taken by the traps were beneficial. I am sure that as soon as the orchardmen of the Province are made aware of the imposition, they will not allow another lantern of the kind to be burned in their orchards.

The Tussock Moth (Orgyia leucostigma), (Fig. 1). Some three or four years ago, the Tussock Moth was considered a serious enemy of shade trees in Toronto, but of late little attention has been paid to it. The citizens are told occasionally by those in charge of the parks that the city is practically free from the pest. As a matter of fact, however, there was little difficulty in finding the egg masses in late fall on any of the streets bordered with shade trees. Experience would tell us that the Tussock Moth has sufficiently recovered from the treatment it received a few years ago to undertake aggressive action the coming season ; and the abundance of the egg-masses on the lower limbs of the trees would indicate that the aggressive activity of the pest would amount to a real danger.

This danger may be averted from Toronto, and, perhaps, the surrounding towns, by timely action on the part of the park authorities and the citizens.

It is well known that the pest passes the winter in the egg stage. The eggs are in masses, which are usually found on the lower limbs, but sometimes on rubbish and fences near the tree. By carefully collecting and burning all the egg-masses that can be found in the winter, few caterpillars will make their appearance in spring. The more carefully the collecting is done, the fewer caterpillars will appear.

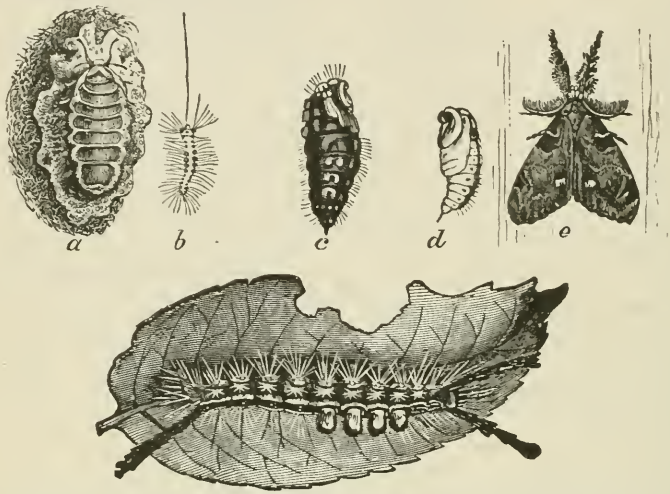


FIG. 1.—Tussock moth. *a*, wingless female on mass of eggs; *b*, caterpillar; *c*, female pupa; *d*, male pupa; *e*, male moth; *f*, full grown caterpillar.

Again, the banding of unattacked trees will prevent the caterpillars from ascending them, while it will also prevent the wingless female moth from climbing the tree and depositing her eggs on the limbs. "A broad, thick, strip of cotton, tied about the trunk of the tree with a string" is as good a band as can be applied. Bands or rings of some coal-tar product are also effective.

GRAIN RUSTS. The damage done by rusts every year to the grain crops of Ontario may be safely estimated by hundreds of thousands of dollars. The amount of damage varies with individual years, according to variations in atmospheric and soil conditions. During damp, warm seasons the damage is usually so severe that, in some localities, but a fraction of the possible yield of grain is obtained, a yield which scarcely pays for the trouble of harvesting and threshing.

What are rusts? Rusts are parasitic plants, that is plants which obtain their nourishment from living matter by sending tiny branches into the tissues They belong to a low class of plants called Fungi, which are characterized by the absence of green coloring material, by the production of spores instead of seeds, and by the very simple structure of their tissues. The rusts, moreover, are very remarkable fungi, from their peculiar habit of changing their habitation from wheat, barley or oats to other plants. Not only do they change their habitation, but they change their form and structure as well, so that it would be impossible, unless one knew, to recognize the wheat rust after it has changed its abode to one of the other plants upon which it develops.

Two stages of wheat and oat rust are probably well known; one, the red rust, develops in early summer, and the other, the black rust, in the late summer and autumn. The characteristic colours of the two stages are given by masses of spores growing in layers upon the plant body of the rust. This plant body consists of a net work of threads living in the tissues of the wheat stem and feeding on the living liquid material. (Fig. 2, A. B.) The spores project from the inside of the wheat stem by the rupture of the skin or bark, and are separated from their stalks by the wind, which may continue to carry them all summer to other wheat and oat fields. Thus the infection spreads by means of the red-rust spores throughout the summer. From the same plant body which pro

duces the red spores, appear the black spores later in the season in equally large numbers These, however, must remain dormant all through the winter on the stubble of the field before they will germinate, so that the black spores are not instrumental in the infection of new fields the season they are produced (Fig 2,C). The red spores are minute, infect the wheat, oval, spiny, one-celled bodies, (Fig. 2, D.) but, the black spores have thicker walls, and are two- celled.

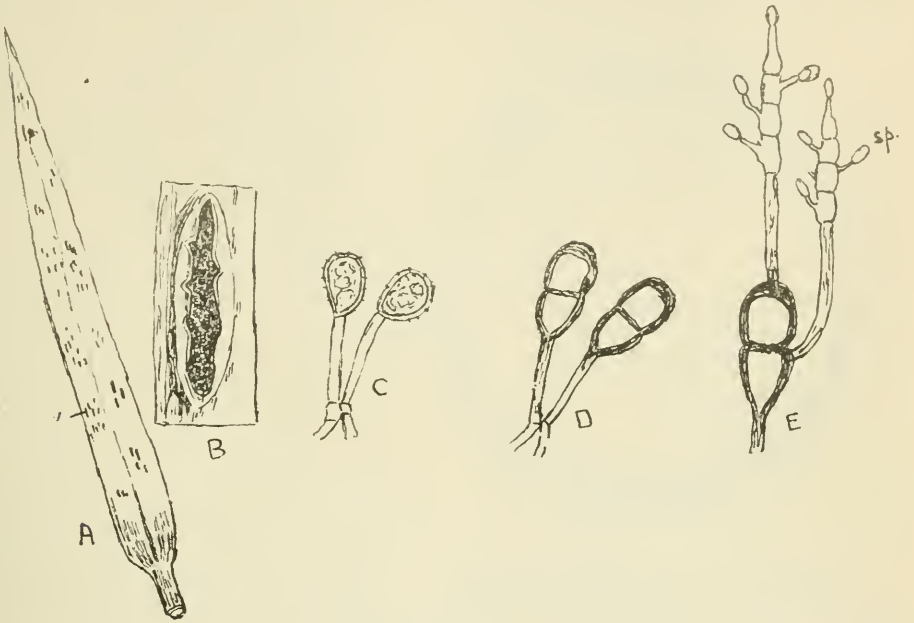


FIG. 2.—*Puccinia graminis.* *a*, leaf of wheat affected with rust spots (1); *b*, a rust spot which has ruptured the epidermis of the leaf, as seen by a good magnifying glass; *c*, two red-rust spores attached to the leaf by their stalks, highly magnified; *d*, two black-rust spores attached to the leaf by their stalks, highly magnified; *e*, a black-rust spore germinating in the spring and giving rise to sporidia (sp.). These may infect the leaves of barberry. (Original).

In the spring the black-rust spores develop a tiny thread and produce new spores called Sporidia, which do not affect the wheat plant, but readily affect the leaves of the

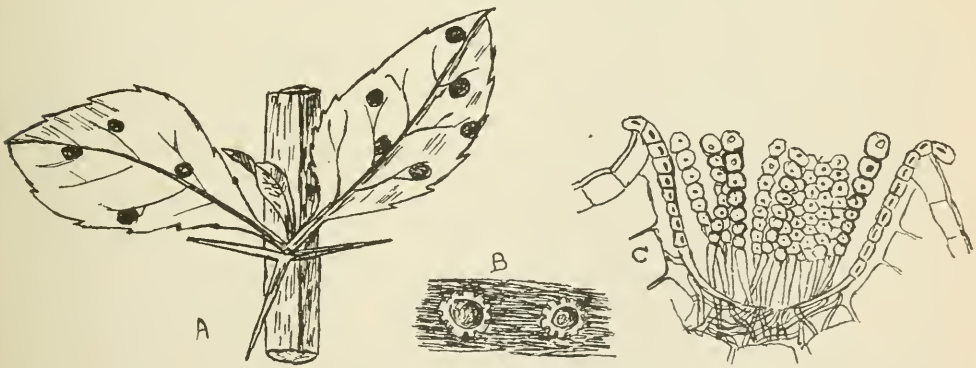


FIG. 3.—*a*, barberry leaves containing clusters of Æcidia or cluster-cups (1); *b*, two cups of a cluster, as seen by a good lens; *c*, section of a cluster-cup, showing how the chains of spores are borne within the cup. These spores on being set free may infect the wheat plants, highly magnified. (Original).

barberry. Two sorts of spores are (Fig. 3, E) formed on the barberry leaf by this infection. One kind is readily seen on the upper side, and the other on the lower surface in yellow,

minute cups called cluster-cups. It is known that the orange-colored spores, when set free from the cluster-cups and blown away to a wheat field will infect the wheat and give rise to a parasitic fungus-plant-body within the wheat stem or leaf, from which red-rust spores are produced.

We thus observe that during its life-cycle the wheat rust fungus bears at least four different kinds of spores, viz., red-rust on wheat in summer, black-rust on wheat in late summer, sporidia (Fig 4) in spring, and cluster-cup spores on leaves of barberry in the spring.

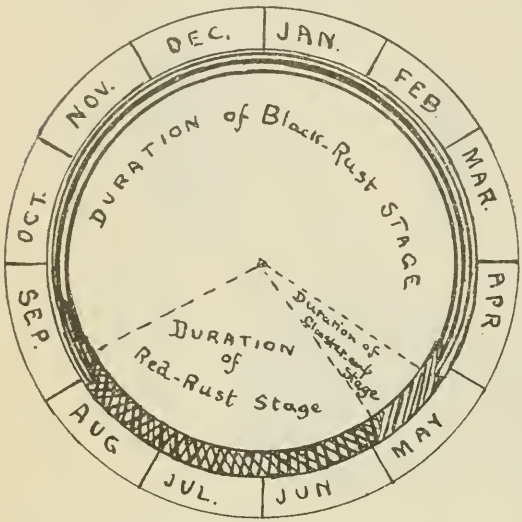


FIG. 4.—Diagram to show the normal life-history of wheat rust (*Puccinia graminis*). - (Original).

That the full history of the wheat rust fungus was not fully known until recent years is not to be wondered at when we consider its wonderful migratory habit, and the extraordinary changes in form which it assumes upon the different plants. It was thought the cluster-cups were entirely different from the rust, but when people noticed more than a century ago that "barberry bushes blasted the wheat" a hint was given to modern research work, in consequence of which the relations and astonishing behaviour of the rusts are better understood. It is now known that with some of the rusts (for there are several hundred varieties) one or more of the three stages is absent or has become extinct; so there are varieties which exist only in the black-rust stage, some in both the red and black-rust stages, and others in all the stages. Whether wheat rust ever omits one of its stages in Ontario is not certainly known, but evidence is accumulating to show that the rust may be prevalent in localities where the barberry is unknown, so that the latter is not absolutely necessary for the continued propagation of the fungus. For example, the cluster-cup stage is not met with in Australia, in Central India, or in the Western States, yet the rust is only too prevalent in those very regions. Nearer home, in the Streetsville district of Ontario, no barberry has been reported, yet the rust is very severe this year, many fields being so badly attacked as hardly to pay for the threshing.*

In districts where the barberry is common the fungus, to all appearances, uses that shrub as a second host, and the full life cycle is then completed as already described. The cluster-cup spores infect some of the wheat plants close by and give rise to the plant body within, from which red-rust spores are liberated during the early summer, and the black-rust spores later in the season. In the vicinity of Barrie the fields of wheat are very badly rusted this year. Moreover, this destruction of wheat by rust is an annual occurrence there, and so disheartened have the farmers become that they approached the Legislature for help last year. The evidence given before a committee of the House was so strong against the barberry that an Act regarding its destruction was placed on the statute books of the Province. There are miles of barberry hedges, however, within the limits of the town of Barrie, over which the outlying municipalities have no jurisdiction, so that as far as the farmers, whose wheat fields are affected, are concerned, the Act is of no use whatever. The infestation is manifestly the result of the spread of the cluster-cup spores from the barberry hedges of Barrie. In all cases the wheat close to the hedges is shockingly bad, and the further removed the field is from the hedge the less marked is the rusting. The infected wheat has grains so shrunken that they would scarcely weigh 20 pounds to the bushel. Two or three interesting cases

* Since writing the above I have been informed on good authority that barberry really exists about Streetsville in quantities capable of infecting large areas of wheat. Mr. J. D. had a hedge twenty rods long, untrimmed, and about fifteen feet high, but after reading my Bulletin in August, had it all destroyed. Other plantations have also been reported, and it is quite probable that the barberry is well distributed in the Streetsville section. W. L.

were noted in the same township of the influence of barberry hedges on wheat fields. A few years ago one or two farmers planted some hedges of this shrub, but to their dismay their wheat fields became badly infested, although prior to the planting, no rust had been observed. After the removal of the offending hedges rust did not again make its appearance.

Mr. C. A. Zavitz, Experimentalist at the Ontario Agricultural College, had a like story to tell. So long as a fine barberry hedge flourished along one side of a certain field on College Farm, the crops were badly rusted, but so soon as the hedge was removed the rust failed to appear. Lately, however, the college fields are badly rusted.

It would certainly appear from these and many other cases which might be given, that if the barberry is not absolutely necessary for the continuous propagation of wheat rust in Ontario it is at least a very important factor.

But how are we to explain the development of rust in regions where there is, undoubtedly, no barberry, or where, according to some authorities, the barberry stage is not a necessary stage in the life-cycle ? Several theories have been proposed.

One theory is that the red rust spores may winter over and infest the wheat directly next season. It has been demonstrated clearly that the red rust spores winter over in Australia, but in no other country has this observation been made.

Another theory which has many strong advocates in America is the probability that a portion of the plant-body, or the tangle of threads living within the tissues of the wheat plant, may winter over and give rise to red rust spores directly the following season. This view, if fully established, would account for much of the extensive early appearance of the rust which is otherwise difficult to explain.

Some investigators have supposed that the black-rust spores, or perhaps their sporidia, may infect the wheat plant directly without the aid of the barberry. All experiments, with one exception, made to test the matter, have failed to get positive results.

Eriksson, the great Swedish investigator of rusts, is of the opinion that " the fungus is transmitted from the rusted parent to the grain as a plasm, which lives a latent life in the cells of the embryo and young plant until just before the eruption of rust spots, at which time it develops an ordinary plant body or mycelium." Athough an ingenious theory, it is not held as a very probable one by a great many very competent authorities.

Eriksson's investigations, however, on ordinary rust, have been very valuable, as he has shown quite conclusively that the red rust spores which produce rust on wheat cannot reproduce the disease on barley or oats, nor can the red rust spores on oats reproduce the disease on wheat or barley, nor the red rust spores on barley reproduce the disease on wheat or oats, although all these varieties of rust belong to one species, Puccinia graminis, and cannot be told apart even by the microscope. Thus there are three distinct " biological varieties " of Puccinia graminis :

Var. 1. P. graminis tritici, on wheat only.

Var. 2. P. graminis secalis, on rye, barley, and couch grass.

Var. 3. P. graminis avenae, on oats, meadow foxtail, and cocksfoot.

The conditions favorable to the spread of rust are moisture and heat. A rainy season, when the intervals are characterized by intense heat, is an ideal one for the spread of rust. Thus, seasons characterized by frequent thunderstorms and accompanying strong winds will have more than the usual amount of rusted grain.

The red-rust spores are distributed by the winds, and the rapidity of the spread is marvellously rapid to the unscientific mind, who looks upon the rust as he would upon the hot blast of a fire scorching the leaves from a distance. As a matter of fact when the red-rust spores are wafted by the winds to unaffected leaves, a period of incubation occurs, from seven to ten days or more, before the rust spots appear on the leaves and stems.

It may be stated here that atmospheric conditions, such as abundant moisture, either as rain or dew, and hot spells, are not the cause of rust, but simply conditions under which rusts will propagate themselves most rapidly. It is not likely that the smoke of locomotives has any influence whatever in the spread of rust, as some farmers claim it has. It is also very essential that plants suitable to the fungus be present, if the disease is to spread rapidly, for every fungus has its own peculiar plant upon which it feeds.

At present no satisfactory method is known for the prevention of the loss by rust. Spraying the crop although theoretically good, is practically impossible, while pickling the seed grain is useless. No practicable method of " policing the atmosphere " and preventing rust spores from finding their way to the young wheat has been devised. Austra-

lia is working along the line of development of rust-resistant varieties, and has secured results of great practical value. "That country now has wheat varieties that are vigorous, true to name, and of exceptional quality for the particular region in which they are grown". While some attention has been given to this important question in America, little has been done in Canada It is believed, however, that varieties of wheat with narrow, erect leaves, and a stiff skin upon which there is a marked, waxy "bloom" are as a rule less easily infected with rust than those with broad, soft, green leaves In England, Nursery, Trump, and Squarehead are highly recommended. In New York and Canada the bearded varieties appear to suffer least. Turkey Red makes a good showing, while the Glyndon of Dakota showed practically no traces of rust.

There appears to be no appreciable difference in resistance of the following varieties sown in Ontario: Manchester, Early Red Clawson, Genesee Giant, Dawson's Golden Chaff, and Democrat, as all were equally affected.

A word here as to rust-resistant varieties. It is probable that the rust-resistant varieties of one district will not be completely rust-resistant in another district, where the soil is richer and moister, and the atmosphere is more humid Local differences are apparent in nearly every section For example, the wheat was more rusted in low lands and valleys about Streetsville than it was on the hillsides and uplands. The reason for this difference in resistance to rust is probably the ranker, more succulent growth of crops in the lowlands, and the greater amount of moisture including dew. It is apparent from the study of plants that if rust-resistant varieties are to be produced in a Province like Ontario, where marked variations in soil and surface conditions exist, the varieties will have to be developed locally.

Along the line of prevention of rust, it has been urged that an excessive use of nitrogenous manures, such as dung or nitrate of soda, should be avoided, as it tends to a growth of strong, soft stems to which rust spores can easily effect an entrance. Again good drainage is decidely beneficial, for the dampness of the soil and the excessive moisture of air will be removed, and the conditions made less favorable for the development of the fungus, as has been described.

If Eriksson's plasm theory be the correct one, it is important that seed grain be procured from localities which do not have the rust, while the destruction of barberry shrubs would be of undoubted value in lessening the intensity of the disease, as I have already shown.

Finally, the destruction of weeds which may harbor some of the stages of the fungus is important. It is impossible to name these plants here, for their names are not even mentioned by investigators.

The Black Rot of Grapes. (*Laestadia bidwellii.*)—This fungous disease is very destructive this year in vineyards which have been neglected, and left unsprayed from year to year. Many grape-growers have been forced to give up the cultivation of grapes, because they have persistently neglected to spray with Bordeaux mixture, and to adopt such measures of cleanliness in autumn as are embraced under the term "clean farming." Numerous inquiries were made this autumn regarding the extent of the damage. The replies indicate that the disease is common in the grape districts, especially those of Essex county. The heavy rainfall during July and August is largely responsible for the virulence of the disease this present season, for experiments show that a moist atmosphere is a most suitable condition for the spread and germination of the spores.

Black Rot is not a new disease. In fact, it is indigenous to America, and it is to be found on the wild forms of grape. Ever since 1885, however, when it was discovered in France, much attention has been paid to it, and now it is considered one of the most destructive enemies of the grape throughout the United States and Canada.

The disease usually makes its appearance first on the leaves, as small brownish blotches, somewhat resembling those of sunscald. A few weeks later, brownish spots appear on the berries, and in a few days the entire berry becomes diseased. A soft rot ensues, followed by a collapse and drying of the tissues. Gradually the berries become shrunken, shrivelled, black, and hard. The surface becomes prominently marked with strong, irregular ridges (Fig. 5).

With the aid of a pocket-lens, the surface will be seen to be covered with minute, black pustules, which contain the summer spores of the fungus (Fig. 6) The spores ooze out to the surface, and are scattered by the rain and wind to unaffected grapes and leaves which begin to show signs of disease within ten or twelve days.

The disease may also spread rapidly from a diseased berry of the cluster to others which are in immediate contact with it, or it may extend from one berry to another by the spread of the fungal threads through the stalks of the cluster.

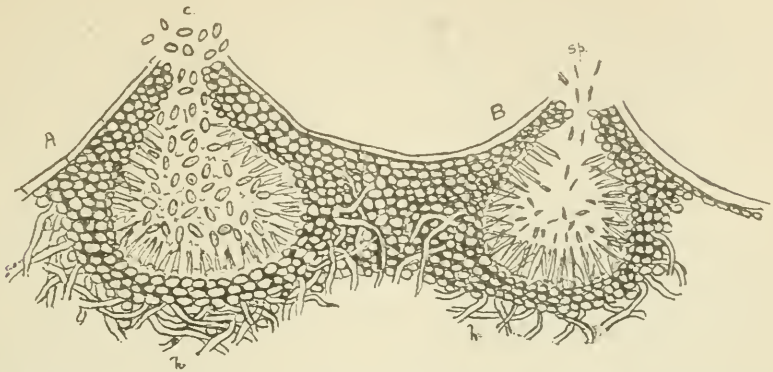


FIG. 6.—Magnified view of sections of two pustules of Black-rot. *a*, a cavity or pycnidium containing the conidia or summer spores, which are borne on the tips of short stalks, or conidiophores; *b*, a cavity or spermagonium containing spermatia spores, borne also on slender stalks, (h) hyphal threads of the fungus within the disorganized tissues.—(Original).

Other spores, the ascospores, are produced during the winter on the shrivelled grapes and leaves left on the vine or on the ground. The ascospores are borne in sepecial sacs, called asci (Fig. 7), and are set free in spring. They are then capable of starting the disease afresh on the leaves.

It is also possible that the fungus may winter over in the fruit and leaves, as close, compact masses of fungus threads, known as sclerotia. From these, in spring, spores are set free, which may infect the new leaves.

With a knowledge of the life-history of the fungus, it is clear that the main remedy is one of prevention. The following preventive remedies will be found effective: 1. Destroy all leaves and dead grapes in the autumn, so as to kill all wintering spores. 2. Spray the vines with Bordeaux mixture just as the leaf buds are beginning to expand, and again at intervals of

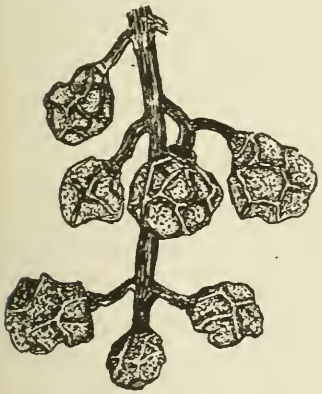


FIG. 5.—A cluster of grapes rendered worthless by the black-rot.—(Original).

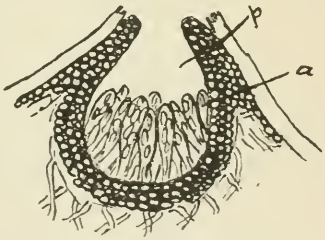


FIG. 7.—The winter form of spore, the Ascospore, produced in club-shaped sacs (a) within a special cavity, a perithecium (p).

ten days or two weeks, until the berries are half grown. If rain occurs frequently to wash off the mixture, frequent applications should be made,—for spores will germinate, unless the vines are covered with the Bordeaux.

In conclusion, I beg to acknowledge the efficient assistance of Mr. Tennyson Jarvis, B.S.A. in the work of this department. He has faithfully performed the work assigned him during the year, and has aided me greatly with my laboratory classes and in the collection of insects and fungi.

Respectfully submitted,
W. LOCHHEAD,
Professor of Biology and Geology.

PART IV.

REPORT OF THE ASSOCIATE PROFESSOR OF BIOLOGY.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith my first annual report as Associate Professor of Biology.

Owing to the fact that my appointment was made late during the year, very little time remained for the arranging and carrying out of experimental work The work herein reported upon, however, will be found to be of considerable interest, and it is hoped in the course of a few years to have much valuable information regarding weed eradication and weed seed dissemination to place at the disposal of the farmers of the Province as well as considerable exact data regarding the nature of the food consumed by our birds.

CLASS ROOM.

As a result of the fact that Botany and Zoology form a part of the work in each of the four years much of my time is occupied in lecturing and demonstrating. In all of the courses now in my charge I have endeavored to make the work as practical as possible, and I am of the opinion that the results have been such as will justify increased attention being paid to the work of the laboratory. It is hoped that the facilities which we will enjoy in our new quarters in the Physical and Biological Building, will permit of many desirable changes along this line. Zoology, which has heretofore been purely a lecture course in the first year, will hereafter be made a lecture and laboratory course. Increased attention will be made to systematic botany and a study of weed problems.

It is our desire that the work pursued in this department by the students, while being technically exact, should also be of such a nature as to increase their powers of observation and cultivate their faculties for drawing correct conclusions.

REPORT ON MUSTARD SPRAYING.

Having received, through President Mills, instructions from the Minister of Agriculture to make a short tour for the purpose of giving practical demonstrations of the effectiveness of the method of destroying Wild Mustard by spraying with a solution of copper sulphate or "bluestone," I arranged dates extending over a period of about three weeks From the fact that the time during which this operation can best be carried out extends only from the time the mustard is about six inches high until it is just coming into bloom, it became necessary to limit the field of operation to one portion of the Province, and the eastern portion was chosen.

I arrived in Whitby on the morning of Monday, June 10th. Having had my apparatus forwarded to this point, I was enabled to proceed immediately to work upon the plot which had been selected upon the farm of Mr. R. L. Huggard. The crop growing on this plot, which was an acre in area, was *Barley*, not seeded down. The barley was about three inches in height as also was the mustard. This field would not be in proper shape for spraying for a week; but, owing to the fact that my succeeding dates were fixed, I was compelled to accept the conditions as I found them, although I was perfectly aware that in this case a second and later spraying would be necessary, as many young seedlings which had not as yet shown themselves above the surface would soon do so. It is necessary that at the time of spraying the crop be sufficiently far advanced to smother any plants appearing after the operation.

The report as sent in by Mr. Huggard fully substantiates his contention.

Leaving Whitby on Monday evening, I arrived in Belleville and the following day, Tuesday, the 11th, I drove out to Foxboro' and gave a demonstration on the farm of Mr. John Thrasher. The crop growing in the plots sprayed was *Oats* ; and here again the mustard was hardly far enough advanced, only three or four leaves being unfolded. A plot of one acre was sprayed with a two-nozzle cluster, and a smaller area with the "Row sprayer." The latter, I believe, is preferable when a slow-walking horse is available. The report of Mr. Holgate is submitted. In a private letter received from Mr. H. R. Ross, he says in regard to this experiment: "Along with Mr. Thrasher I looked over the plots sprayed, and from what I saw we are both fully convinced that the experiment was a complete success."

The following day, Wednesday, the 12th, it was necessary for me to go to Caledonia to address a meeting, and hence it was Thursday before I reached Picton.

On Friday, June 14th, I gave a demonstration on the farm of Mr. J. Allison, near Yerexville, the crop in the plot being *Spring Wheat.* The wheat was about two feet high and the mustard had been in full bloom for some days. The spraying was done both with the two-nozzle cluster and with the row sprayer. Another small spot was sprayed in which the mustard was only about three inches high. The report as submitted by Mr. Yerex is appended.

The following day I left for Andrewsville, and on Monday, the 17th, I operated upon the fields of the farm of Messrs. Newman and Derrick. The plots of the former were in *Wheat* and *Oats.* The mustard was well out in bloom and the crop about six inches to one foot high. Two acres were sprayed. Those of the latter were in *Oats* and *Barley,* and the mustard was about four inches high. The results of the experiment were very satisfactory, and both of these gentlemen intend to carry out the operation upon a large scale. The report is submitted by Mr. Newman.

Owing to the great interest which my first demonstration had created, I decided to return to Prince Edward County. A couple of wet days materially interfered with my plans. On the 21st, I gave a demonstration upon the farm of Mr. J. A. Sprague, Demorestville. The crop in this plot was *Oats,* and the mustard was from five to six inches high. This test I consider most important, as the conditions were probably more favorable than at any other point of operation. The report of Mr. Sprague shows that, when taken at the proper time, the mustard can be entirely destroyed by this method.

The next day I went out to the "Sand Banks," about ten miles from Picton, with the intention of giving a demonstration at the "Grangers' Picnic" held there that day. However, owing to the immense crowd, the owner of the field in which I was to operate became alarmed lest his crop should be trampled under foot by the spectators. I therefore had to limit myself to a lecture on the subject. On Monday, the 24th, I returned to Toronto, but on the following day went back to Whitby, in order to fully convince the farmers of the effectiveness of this method, and also to correct some false impressions which had gone abroad. This was my last demonstration, and was given on the farm of Mr. R. L. Huggard on Saturday, June 9th. The report, as submitted by Mr. Huggard, is very satisfactory, and should go far to convince the "doubting Thomases" of that district that there are other methods of getting rid of mustard than those which they have been following for years.

The Method Described. After four years of experimenting with the "Bluestone Method" of destroying that noxious weed, commonly known in our western counties as "Wild Mustard," and in the east as "Herrick," we can, without the least hesitation, recommend it to farmers whose fields are badly infested. In cases where the mustard plants are sufficiently rare to admit of hand pulling, it will not be necessary to spray with the Bluestone solution. However, there are thousands of acres of fertile land in the Province which have become so badly infested that hand picking is impossible. To those we would say, take up this new method and go systematically to work to rid your farms of this pest, which is each year drawing from your fields enormous quantities of plant food, and involving you in serious loss from year to year.

The method is practicable where the ground is sown to oats, barley, or wheat, and no injury results either to the crop or to the young clover or timothy plants, if it be seeded down.

(*a*) *Time of Spraying*:

The exact date of spraying, of course, cannot be given, owing to the variations of

weather in our seasons. However, the exact stage in the development of the crop and the mustard at which the spraying is most effective has been ascertained. If it is the intention to make but one application, the solution should be applied after the mustard plants have produced a considerable leaf surface, but before they come into bloom. It is true that the mustard plants at this stage are not so susceptible to the spray as when they are less developed; but, if the spraying is done in this earlier stage, a second application is made necessary, because of the fact that the crop will not be far enough advanced to smother out the young mustard seedlings which will make their appearance after the operation. If the spraying is delayed until after the mustard comes into full bloom, some of the plants will mature seed and in this way lessen the effectiveness of the treatment.

The spraying should be done on a calm, bright day. A heavy shower of rain coming immediately after the operation will make a second spraying necessary.

(*b*) *Preparation of Solution :*

Place ten pounds of Copper Sulphate, or "Bluestone", in a coarse bag and suspend it in about three gallons of boiling water. The crystals will be entirely dissolved in from fifteen to twenty minutes. Strain the solution into the pump barrel, and fill up with cold water to forty or forty-five gallons. Apply this quantity to each acre.

(*c*) *Method of Applying Solution* :

The best method of applying the solution is with an ordinary barrel spray pump, such as is used for the spraying of fruit trees. Place this in a cart or light wagon and drive slowly through the field, applying the chemicals in such a way that all the mustard will be wetted. The "Bamboo Rod Attachment" with a two or three cluster nozzle will do the work very effectively, but not so rapidly as the "Extension Rod Attachment", attached to the back of the cart or light wagon

Your results will depend almost entirely upon the throughness with which you do the spraying.

Some Advantages of This Method.

(1) It is practicable where hand pulling is not.

(2) If carried out thoroughly for four years, all the mustard which remains can easily be pulled.

(3) It makes it possible to exterminate this pest without missing a season's crop.

(4) The increase in the yield of grain, which results from the increase in the fund of plant food placed at the disposal of the crop, owing to the mustard plants having been killed, will usually cover all expense connected with the operation.

(5) The original outlay amounts annually to only eighty cents per acre.

OPINIONS OF CORRESPONDENTS.

Dear Sir,—Your letter of the 19th received, and in reply would say that the spraying to kill the mustard was a perfect success; that is the last spraying. The first time all was killed that was sprayed, but some came on later, but the last time was a perfect success. Many inquiries were made by the people, who noticed the sprayed portion, and it was hard to convince them that the oats were not injured. In about three days after spraying, the plot had a brown appearance, and the passerby thought that it was the grain that was killed, but a closer inspection plainly showed them their mistake.

I think to do the job properly, the field of mustard should be sprayed twice, or perhaps if a little more time were taken so as not to miss a stalk with the spray, once would do. One thing is certain, however, the sulphate will kill the mustard without injury to the oats, barley or wheat.

R. L. Huggard, Whitby.

Dear Sir,—In reply to your inquiry as to the effect of spraying on the mustard and the crop on my farm, I have to say that the mustard was all killed; and, strange to say, it seemed to disappear. The oats were affected slightly on some of the tender leaves, but in a few days had fully recovered, and at harvest time were better than where the mustard was left and allowed to grow. I am fully convinced that spraying will destroy all mustard, and the crop will be sufficiently increased to pay all expenses in connection therewith. John A. Sprague, Demorestville.

DEAR SIR,—Your letter in which you desired information regarding the results of mustard spraying demonstration, was duly received, but as I was at that time away from home and my mail was not forwarded to me, I did not receive your letter until I arrived home last week. Before I left home, I had, however, been over the field which had been sprayed. The first field sprayed I inspected first. As you remember, some of the mustard had advanced so far that they already had seed pods upon them. These were the only plants of which I could find any trace. The other plants had been totally destroyed and could not be distinguished. In the other field where the mustard was very small, I could find no traces of the mustard, as it had been totally destroyed and the sun had completely dried the plants up. W. L. YEREX, Picton.

DEAR SIR,—I received your letter some time ago, and I have been so busy that I have not had time to go down and see the experiment before. I was down one night last week and saw it. I may say that Mr. Thrasher and I both think it was a success, and would have been a greater success had not the wet weather started a lot more seed growing. We cannot see any injurious effects on the grain, and now the crop is better where it was sprayed than where it was not sprayed. THOMAS HOLGATE, Foxboro'.

DEAR SIR,—I am very much pleased indeed to be able to send in such a favorable report on the result of the spraying of wild mustard as carried on here by you in June.

The solution you made was very effective indeed, and a good deal of enthusiasm has been created over this quick and economical method of eradication. In two or three days after you sprayed, the mustard plants turned very brown, and they continued to get a deeper color until they were almost black. The leaves of the grain (oats and wheat mixed) also got slightly brown, but this passed off in a few days without apparently injuring the grain.

A duplicate plot or strip of grain was left in the same field unsprayed, to see if there was any difference in the growth after spraying. This difference was very marked, for as soon as the growth of the mustard plants was checked, the grain grew very rapidly and went ahead of the unsprayed strip very quickly. I am sure that the increase in yield by spraying more than covered all expenses connected therewith. L. H. NEWMAN, Andrewsville.

THE HERBARIUM AND SYSTEMATIC BOTANY.

For several years past very little attention has been given to the bringing together of a representative collection of our Ontario plants The cause, no doubt, was, not that the value of such a collection was not appreciated, but rather that entomological problems demanded attention during the summer months. In an institution of this kind, where information is being continually sought for by farmers and others regarding the indentification of specimens, it is very necessary that a complete collection should be available. It is also desirable, and in fact essential, to the giving of a practical course in Systematic Botany to our students, that they should have dried specimens to examine. The specimens used for analysis in our courses in Systematic Botany are preserved in alcohol and formalin. Work was begun during the past summer upon the flora of Guelph and its vicinity, and a small collection of 67 species, representing fifty six genera, was added to the herbarium. It is hoped that, in a few years, we shall be able to publish a complete flora of Wellington County.

The past few years have been marked by a very rapid increase in the population of New Ontario. This means that within a very short time, the nature of the flora of this part of the Province will be vastly changed ; and, unless expedition is sent to make a study of the natural flora of this district, much valuable data and no doubt many rare species will be lost to us. We hope that during the summer of 1902, we may be enabled to spend a few weeks in the northern part of the Province making collections and studying the flora and fauna. Without doubt, much valuable information would be gained from such an undertaking and considerable interesting material gathered together, which could be placed in our new museum.

Plants Placed in the Herbarium, 1901, Wellington County Flora

Germs.	Species.	Where Found.	Month.	Day.	Common Name.
Aster	sagittifolius	Speed Bank, south of Sleeman's	9	21	Aster.
Aster	puniceus	R. Crane's Flats	9	12	Purple-Stem Aster.
Alisma	plantago	Stone's Swamp	7	8	Water Plantain.
Actea	alba	Dairy Bush, O.A.C	6	6	White Baneberry.
Arisaema	triphyllum	No. 19 Bush, O.A.C	6	5	Indian Turnip.
Actea	rubra	Dairy Bush, O.A.C	6	6	Red Baneberry.
Antennaria	plantaginifolia	Stone's Farm	6	1	Everlasting.
Amelanchier	Canadensis	Above Pipe's Dam, 1st Cross-road	5	11	Shad-Bush.
Anemone	nemorosa	River Bank, above Pipe's Dam	5	11	Wind-Flower.
Alopecurus	geniculatus	Stone's Swamp	6	1	Floating Foxtail.
Cicuta	maculata	Stone's Swamp	7	8	Spotted Cowbane.
Chelone	glabra	Paradise, River Speed	8	17	Turtle's Head.
Carduus	nutaus	North of Stone's House	10	21	Musk Thistle.
Carduus		Road Side, rear of Dairy Bush	10	15	
Cynoglossum	officinale	College Heights—Keough's	6	4	Hound's Tongue.
Carex	gracillinia	No. 19 Bush, O.A.C	6	5	
Caulophyllum	thalictroides	Dairy Bush, O.A.C	5	2	Blue Cohosh.
Capsella	bursa-pastoris	College Fields	5	15	Shepherd's Purse.
Cerastium	viscosum	Behind Sleeman's Brewery	5	27	Mouse-Ear Chickweed.
Carex		Dairy Bush, O.A.C	5	2	
Cichorium	Intybus	Road Sides	9	12	Chicory.
Claytonia	Caroliniana	Dairy Bush, O.A.C	..	..	Spring Beauty.
Carex	intumescens		..	..	
Chelidonium	majus	Swamp, near McCrae's	7	9	Celandine.
Dicentra	Canadensis	River Bank, above Pipe's Dam	5	11	Squirrel Corn.
Dicentra	cucullaria	Puslinch Bush, O.A.C	4	30	Dutchman's Breeches.
Diplotaxis	muralis	Kent County	..	..	Sand Rocket.
Dirca	palustris	Hart's Bush	4	30	Leatherwood.
Epilobium	augustifolium	Stone's Road-side	7	8	Great Willow Herb.
Erysimum	cheiranthoides	R Crane's Flats	5	27	Worm Seed Mustard.
Erythronium	Americanum	Dairy Bush, O.A.C	..	..	Dog Tooth Violet.
Fragaria	Virginiana	No. 19 Bush, O.A.C	6	5	Wild Strawberry.
Geum	strictum	Stone's Swamp	7	8	Avens.
Glyceria	fluitaus	Stone's Swamp	7	8	
Galium	aparine	Puslinch Bush, O.A.C	5	27	Cleavers.
Hydrophyllum	Virginicum	Experimental Bush, O.A.C	5	27	Water-Leaf.
Lactuca	scariola	North London	10	..	Prickly Lettuce.
Lolium	perenne		..	..	Perennial Rye Grass.
Medicago	lupulina	Fields and Roadsides	6	1	Black Medick.
Mitella	diphylla	Dairy Bush, O.A.C	5	10	Bishop's Cap.
Osmorrhiza	brevistylis	R. Crane's, River Bank	5	27	Hairy Sweet Cicely.
Pyrola	rotundifolia	Stone's Swamp	7	8	Wintergreen.
Phlox	divaricata	Puslinch Bush, O.A.C	5	15	Wild Phlox.
Prunus	Virginiana	Near Lime Kiln—Sleeman's	5	27	Choke Cherry.
Polygonatum	biflorum	Experimental Bush, O.A.C	5	28	Solomon's Seal.
Ranunculus	Pennsylvanicus	Stone's Swamp	7	8	Bristly Crow-foot.
Ranunculus	scleratus	Stone's Swamp	6	1	Cursed Crow-foot.
Rumex	crispus	Fields, O.A.C	6	5	Curled Dock.
Sowchus	arvensis	Kennan's Field	7	8	Perennial Sow-thistle.
Sanguinaria	Canadensis	Dairy Bush, O.A.C	4	25	Blood-Root.
Sedum	acre	Macdonald's Field on Brock Road	7	4	Mossy Stone-Crop.
Scutullaria	galericulata	Stone's Swamp	7	8	Skull Cap.
Silene	noctiflora	Field No. 1, O.A.C	6	6	Night Flowering Catch-fly.
Sambucus	Canadensis	River Bank—Sleeman's	..	..	Elder.
Smilacina	stellata	Experimental Bush, O.A.C	5	28	False Solomon's Seal.
Smilacina	racemosa	Experimental Bush, O.A.C	5	28	False Spikenard.
Solanum	rostratum		..	..	Prickly Solanum.
Scleranthus	annus	Grain Field, near Paris	..	..	German Knot-Grass.
Thalistrum	polygamum	Bank of River Speed	7	9	Tall Meadow Rue.
Tiarella	cordifolia	No. 19 Bush, O.A.C	6	5	False Mitre-wort.
Trillium	erectum	River Bank, above Pipe's	5	11	Wake Robin.
Taraxacum	taraxacum	College Campus	5	10	Dandelion.
Viola	Canadense	River Bank, above Pipe's	5	11	Canada Violet.
Viola	blanda	Puslinch Bush, O.A.C	5	15	Sweet White Violet.
Viola	pubescens	Dairy Bush, O.A.C	5	10	Downy Yellow Violet.
Viola	Selkirkii	McAllister's Swamp	5	6	Great Spurred Violet.
Waldsteinia	fragarioides	Sleeman's Park	5	7	Barren Strawberry.

Bird Notes

The past season has certainly been an encouraging one for those of our citizens who took an interest in the welfare of our feathered friends. While, so far as I have yet learned, very few new species have been reported, yet many of our most beneficial varieties showed a marked increase in numbers. For instance, the trim little Bluebird (*Sialia sialis*) and the bright plumaged Baltimore Oriole (*Icterus galbula*), both of which are desirable from an economic and aesthetical standpoint, showed a marked increase in numbers. This I believe to be one of the first fruits of a popular sentiment adverse to the destruction of such active friends by the bloodthirsty "small boy," and the pecuniary-spirited bonnet decorator, which of late has grown to such proportions among the general public. With the exercise of vigilance by the proper authorities, and the continuance of the "Bird Protection" crusade, I think that our insectivorous friends will have become so numerous that our insect enemies will cause us less trouble. Every effort will be made in our work here to stimulate the growth of a spirit of appreciation of the valuable work done by birds in the destruction of injurious insects and weed seeds.

Many erroneous ideas prevail among agriculturists regarding the relative amount of good and injury done by many of our abundant species As we study more and more closely the habits of birds, we are more and more convinced that the general result of their existence is acting strongly as a material benefit to farmers and horticulturists, and the list of "condemned species" grows shorter from year to year.

The causes for the prevalence of erroneous ideas regarding our birds are many and widely different. Chief among them may be mentioned: 1st, The injury they do, if any, is apparent, while the good they do is frequently indirect and as a result more or less obscured to the superficial observer; 2nd. Whole classes of birds are condemned because they have among their numbers one or two species of pernicious habits, *e.g.*, indiscriminate slaughter of hawks, owls and sparrows is frequently advocated, and yet when the economic status of the various species of these classes have been definitely determined, we learn that while but very few are wholly injurious, the vast majority are highly beneficial to agriculture, in that they feed largely upon rodents and weed seeds.

If there is any one class of birds which in the mind of the general public is unconditionally condemned, it is "Sparrows." For the past two years I have been studying the habits of our sparrows and making examinations of their stomach contents; and although my observations are as yet very incomplete, I can say that there is not a single species wholly injurious, while, as a class, they stand unrivalled as weed destroyers and quite high in the list as destroyers of injurious insects.

The common species of this part of the Province are:

The Song Sparrow, Chipping Sparrow, Vesper Sparrow, Tree Sparrow, Field Sparrow, Savanna Sparrow, White Throated Sparrow, Swamp Sparrow, Fox Sparrow, and English Sparrow, the last being an imported species (*Passer domesticus*), and the one chiefly accountable for the disreputable name borne by the whole class.

Elsewhere in this volume will be found illustrations of two species, viz., the Tree Sparrow (*Spizella monticola*) and the White Throated Sparrow (*Zonotrichia albicollis*). Both of these feed largely upon the seeds of such plants as pigweed, lamb's quarters, ragweed, barnyard grass, and chickweed. The latter also feeds to some extent upon various wild berries and also insects; while the value of the former lies chiefly in the fact that it is an abundant species and great destroyers of weeds.

Bird Migrations.

Below I have given in tabulated form "Migration Notes for 1901", and the "First Arrivals for the Past Five Years". For much of this valuable information I am indebted to Messrs. Norman Beattie and Smith Walker, members of the Wellington Field Naturalist Club, of which Club I have the honor to be President.

Migration Notes for 1901.

Name of Bird.	When was it first seen?	About how many w'reseen	When was it next seen?	When did it become common?	When was it last seen?	Is it common or rare?	Does it breed near your s'n?	Remarks.
Mallard Duck	Feb. 18	1	Mar. 24			Not rare	Yes	
Prairie Horned Lark	Feb. 26	2	Mar. 1	Mar. 9		Common	Yes	Very common in early spring.
American Crow	Feb 24	7	Feb. 28	Mar. 12		Common	Yes	Very abundant.
American Goldfinch	Feb. 28	30	Mar. 16	Apr. 12		Common	Yes	
American Merganser	Mar. 4	1	Mar. 9			Rare	No	Seen in Speed River.
Downy Woodpecker				Resid't		Common	Yes	Nest with young found June [9th.
Hairy Woodpecker				Resid't		Common	Yes	
White Br'sted Nuthatch				Resid't		Common	Yes	
Red Breasted Nuthatch						Rare	Yes	Pair noted breeding.
Brown Creeper	Mar. 9	4	Mar. 10	Apr. 11		Common	Yes	
Slate Colored Junco	Mar. 9	20	Mar. 10	Apr. 11		Common	Yes	
Sharp Shinned Hawk	Mar. 15	1	Mar. 30			Rare	Yes	
Blue Bird	Mar. 16	1	Mar. 23	Mar. 26	Oct. 22	Common	Yes	Becoming plentiful.
American Robin	Mar. 18	1	Mar. 19	Mar. 25		Common	Yes	
Song Sparrow	Mar. 23	1	Mar. 24	Mar. 26		Common	Yes	
Meadow Lark	Mar. 23	1	Mar. 25	Apr. 5		Common	Yes	
Golden Crowned Kinglet	Mar. 23	3	Mar. 30	Apr. 10		Common	?	Common in spring and fall.
Killdeer Plover	Mar. 23	3	Mar. 25	Apr. 10	Oct. 24	Common	Yes	
Bronzed Grackle	Mar. 25	10	Mar. 26	Mar. 26		Common	Yes	
Rusty Grackle					Sept. 14		No	More common in fall.
Tree Sparrow								Winter visitor.
Phoebe	Mar. 26	1	Mar. 30	Apr. 8		Common	Yes	More common in 1901.
Chipping Sparrow	Mar. 27	4	Apr. 19		Oct. 19	Common	Yes	
Vesper Sparrow	Mar. 28	1	Apr. 9	Apr. 13		Common	Yes	
Cow Bird	Mar. 30	5	Apr. 8	Apr. 16		Common	Yes	
White Rumped Shrike	Mar. 30	2	Apr. 9			Common	Yes	
Cooper's Hawk	Mar. 30	1	Apr. 14			Common	Yes	
Red Shouldered Hawk	Mar. 30	1	Apr. 9	Apr. 11		Common	Yes	
Great Blue Heron	Apr. 6	1	Apr. 9	Apr. 9	Oct. 24	Common	Yes	
Ruffed Grouse			Resid't			Common	Yes	
Sparrow Hawk	Apr. 9	1	Apr. 11			Common	Yes	
Red Winged Blackbird	Apr. 9	1	Apr. 11			Common	Yes	
Blue Jay			Resid't			Common	Yes	More common in spring and [fall.
Great Horned Owl			Resid't			Rare	Yes	
Fox Sparrow								Winter visitor.
Yellow Bellied Sapsuck'r	Apr. 13	2	Apr. 20			Common	Yes	
Kingfisher	Apr. 14	1	Apr. 17			Common	Yes	
Purple Finch	Apr. 16	1	Apr. 27	May 4	Oct. 19	Common	Yes	
Canada Goose	Apr. 17	4			Nov. 7			Passing migrat t.
Wilson's Snipe	Apr. 17	1	Apr. 19		Oct. 20	Not rare	No	Passing migrant.
Tree Swallow	Apr. 17	1	Apr. 28		Sept. 9	Numer's	Yes	
Flicker	Apr. 17	1	Apr. 18			Common	Yes	
Ruddy Duck	Apr. 23	1				Rare	No	Passing migrant.
White Throat'd Sparrow	Apr 14	2	Apr. 28	Apr. 30	Oct. 18	Common	Yes	
Savanna Sparrow	Apr. 23	1	Apr. 25	Apr. 29		Common	Yes	
American Bittern	Apr. 23	1			Oct. 17	Common	Yes	
Ruby Crowned Kinglet	Apr. 23	2	Apr. 27	May 7		Common	No	
Winter Wren	Apr. 24	4	Apr. 25			Not com.	Yes	
Barn Swallow	Apr. 28	10	Apr. 29	Apr. 29	Sept. 10	Common	Yes	
Palm Warbler	Apr. 28	2			Sept. 10	Not com.	No	Passing migrant.
American Woodcock	Apr. 28	6			Oct. 20	Not com.	Yes	
Chimney Swift	Apr. 29	1	Apr. 30	May 5	Sept. 1	Common	Yes	
House Wren	Apr. 30	1	May 3	May 7		Common	Yes	
Blk Thr'ted Gr. Warbler	Apr. 30	1	May 4	May 14		Common	Yes	
Cat Bird	May 1	2	May 4	May 4		Common	Yes	
Morning Dove	May 1	2					Yes	
Red Eyed Vireo	May 3	1	May 7	May 24		Common	Yes	
Black & White Warbler	May 4	3	May 14	May 24		Common		
Least Fly Catcher	May 5	1	May 6	May 8		Common	Yes	
Yellow Warbler	May 5	1	May 15	May 17		Common	Yes	
Screech Owl			Resid't			Common	Yes	
Baltimore Oriole	May 8	3	May 9	May 10		Common	Yes	Probably more common than [usual.
White Crowned Sparrow	May 10	2				Not com.		
Bobolink	May 10	12	May 11	May 11	Sept. 9	Common	Yes	
Crested Fly Catcher	May 11	1	May 12	May 12		Common	Yes	
Myrtle Warbler	May 14	4	May 24	May 24	Oct. 18	Common		
Black Billed Cuckoo	May 14	1	May 18	May 22		Common	Yes	

MIGRATION NOTES FOR 1901.—*Continued.*

Name of Bird.	When was it first seen?	About how many w'reseen	When was it next seen?	When did it become common?	When was it last seen?	Is it common or rare?	Does it breed near your st'n?	Remarks.
Wood Pewee	May 14	1	May 18			Common	Yes	
Night Hawk	May 16	1	May 21	May 27		Common	Yes	
Yellow Billed Cuckoo	May 17	1	May 22	May 22		Common	Yes	
Red Headed Woodpecker	May 19	1	May 19			Common	Yes	
Least Sandpiper	May 19	1				Rare	No	Passing migrant.
Wilson's Warbler	May 24	1				Rare	No	Passing migrant.
Redstart	May 24	2				Common	Yes	
Maryland Yellow Throat	May 24	3				Common	Yes	
Bay Breasted Warbler	May 24	10	May 25	May 26		Not com.	No	Passing migrant.
Blackburnian Warbler	May 24	6	May 26			Not com.	No	Passing migrant.
Chestnut Sided Warbler.	May 24	3	May 26			Common	Yes	
Warbling Vireo	May 24	10	May 25			Not rare	Yes	
Wood Thrush	May 24	1			Oct. 18	Not com.	Yes	
Wilson's Thrush	May 24	3		May 24		Common	Yes	
Blue Headed Vireo	May 25	1				Very rare	No	
Olive Backed Thrush	May 25	1				Rare	Yes	
Scarlet Tanager	May 25	1				Not com.	Yes	
Magnolia Warbler	May 26	1				Not com.	No	Passing migrant.
Ruby Thtd. Hum'g Bird	June 3	1			Sept. 20	Not com.	Yes	

BIRD MIGRATION.—*Spring Dates of First Arrivals.*

NAME.	1897	1898	1899	1900	1901
Prairie Horned Lark	Feb. 17	Feb. 18	Feb. 20	Feb. 8	Feb. 26
American Crow	2—22	2—22	2—15	2—22	2—24
Chickadee					
Rough Legged Hawk	2—27				
Pine Grosbeak	3— 5		2—24	2—10	
American Merganser					3— 4
R. Downy Woodpecker			3—10		3— 4
R. Hairy Woodpecker			3— 3	2—10	3— 4
R. White Br. Nuthatch			3—19	2—27	3— 9
Brown Creeper					3— 9
Slate Colored Junco	3—25		2—15		3— 9
Red Shouldered Hawk	3—25				3—30
Sharp Shinned Hawk				4—16	3—15
Cooper's Hawk				4—16	3—30
American Goldfinch			3—10		2—28
American Robin	3— 8	3— 7	3—11	3—29	3—18
Blue Bird	3—10	3—16	3—12	3—29	3—18
Cedar Waxwing	3—13		4—27		
Killdeer Plover	3—21	3—17	4— 4	3—31	3—23
Meadow Lark	3—21	3—19	4— 5	4— 3	3—23
Bronzed Grackle	3—22	3—17	4— 5	4— 1	3—25
Song Sparrow	3—22	3—14	3—14	3— 8	3—23
White Rumped Sprike	3—23	3—28	4—10	4— 7	3—30
Golden c'd Knight			4—22	4—13	3—23
Red Winged Blackbird	3—26	4— 8	4—11	4—24	4— 9
Great Blue Heron	3—26	3—19	4—10	4— 7	4— 6
Mallard	3—29	3—21	3—24		3—24
Flicker	3—30	3—16	4—12	4—12	4—17
Blue Jay		3—16	4—17	3—31	4—10
Purple Finch	3—18	4—25	3—17	5— 2	4—27
Canada Goose			3—11		4—17
Cow Bird	4— 2	4—11	4—18	5— 5	3—30
Pied Billed Grebe			4—27		
Vesper Sparrow	4— 2		4—14	4— 9	3—28
Chipping Sparrow	4— 2		4—22	4—19	3—27
Sarauna Sparrow	4— 7	3—28			4—23
Phoebe	4—11	3—28	4—15	3— 3	3—26
Yellow Bellied Sap Sucker	4—11		4—22	4 -15	4—13
House Wren	4—29		4—16		4—30

NOTE —In each of the columns the first figure denotes the month of the year, and the second figure the day of the month, *e.g.*, 5—16 May 16th.

BIRD MIGRATION.—*Continued.*

NAME.	1897	1898	1899	1900	1901
Marsh Hawk	May 29		May 28		
White Throated Sparrow	4—14	4—29	4—25	4—28	4—28
Sparrow Hawk	4—23				4— 9
Towhee	4—23			5— 6	
Swamp Sparrow	4—23		5— 3		
Barn Swallow	4—25	4—16	4—22		4—28
Tree Swallow		4—18	4—14		4—17
King Fisher	4—25	4— 8	4—17	4—16	4—17
Spotted Sandpiper	4—26		4—29	4—21	4—29
Yellow Warbler	4—27	5— 3	4—30	5—10	
Red Headed Woodpecker		5— 8	4—19	5—12	
Bay Breasted Warbler			4—22		
Black and White Warbler	5— 2	5— 4	4—22	4—22	
Virginia Rail					
Sora Rail					
Wilson's Snipe			4—25		4—17
King Bird	5— 9	5—13	4—27	5— 8	
Chimney Swift	5— 3	5—11	4—27	4—24	4—29
Cat Bird		5—15	4—29	5—10	
Bobolink	5— 3		5— 2	5—10	
Least Fly Catcher	5— 9		4—29	5— 8	
Baltimore Oriole	5— 9	5— 6	5— 2	5— 8	
Wood Pewee	5—20	5— 7	5— 3		
American Bittern	5—28	5— 8		4—23	4—23
Red-eyed Vireo	5— 9	5—13	5— 4		
Myrtle Warbler			5— 4	4—30	
Whip-poor-will	5—30		5— 5		
Brown Thrasher	5—10		5— 7	5— 6	
Oven-bird	5— 3	5—12			
Scarlet-Tanager	5— 9		5—11		
Warbling Vireo	4— 8				
Black Billed Cuckoo	5—26		5—11		
Traill's Flycatcher	5—26				
Rose Breasted Grosbeak	5— 9	5— 4	5—11		
Black Throated Blue Warbler	5—10			5— 5	
Canadian Warbler	5— 9		5—11		
Chestnut Sided Warbler	5— 9		5—11	5— 5	
Wood Thrush	5—13				
Black Burman Warbler			5—11	5— 8	
Black Throated Green Warbler	5— 3	5— 4	5—11	5— 8	4—30
Indigo	5—16				
Magnolia Warbler			5—11		
Mourning Warbler	5—16			5— 8	
Water Thrush	4—30		5—11		
Maryland Yellow Throat	5— 9			5— 9	
Night Hawk			5—11		
Wilson's Thrush			5—16		
Cliff Swallow			5—18		
Crested Flycatcher	5—10		5—18		
Ruby Throated Hummer	6— 8				
Bank Swallow				4—27	
Red Start	5—21				
Yellow Throated Vireo					
Green Heron					
White Crowned Sparrow					
Yellow Legs					
Solitary Sand Piper					
Ruby Crowned Ringlet					4—23
Winter Wren					4—11
American Woodcock					4—28
Palm Warbler					4—30

MANNING W. DOHERTY,
Associate Professor of Biology.

PART V.

REPORT OF THE PROFESSOR OF CHEMISTRY.

To the President of the Ontario Agricultural College :

SIR,—I beg to submit herewith my first annual report of the work done in the Department of Chemistry.

On the 28th of October, 1901, Dr. Shuttleworth resigned his position as head of this department. The next day I was informed that I had been promoted to fill the vacancy, the appointment to date from the 1st of November. While it is thus only a month since I took charge of the department, my report will deal with all the work of the year, with the exception of the experiments in sugar beet cultivation. Dr. Shuttleworth had special charge of these experiments, and will make a full report of the work.

During the past year no special changes have been made in the instruction given the first and second year students. The extension of the work for the B.S.A. degree from a course of three years to one of four has made it possible to give all the third year men a better training in qualitative analysis, and to give them considerable gravemetric work. They were also able to make fodder and water analyses.

In former years, four lectures, dealing principally with elementary chemistry, were given to the students of the dairy school. Last year, eight lectures, dealing more directly with the chemistry of milk and its products, were delivered and each student received fifteen days' practical instruction in the laboratory. The practical course covered the following points: The separation of the water, casein, albumen, sugar, fat, and ash of milk; simple experiments showing the effect of lack of ash constituents in milk on the coagulation with rennet; and the difference between rennet and acid coagulation; analyses of butter; methods of detecting the purity of butter; preservatives in milk; the purity of salt; preparation and use of the alkaline solution. Determinations were also made of the percentage of acid in milk and in whey at the various stages in the making of cheese.

OUTSIDE WORK.

Last spring a joint circular was issued by the Dairy, Bacteriological, and Chemical Departments, a copy of which appears in the report of the Professor of Bacteriology, in which these departments offered to co-operate with cheese-makers, butter-makers, and dairymen in general, to discover the causes of difficulties that might arise, and offering to furnish pure cultures and alkaline solutions at a nominal cost. A number of responses were received and help was given; and this is a line of work we are desirous of continuing. We therefore invite all dairymen having difficulties in the handling of milk, or in its manufacture into cheese and butter, to communicate with us.

WATER ANALYSES. Over thirty samples of drinking water have been analysed during the year. While a majority of the waters proved, on analyses, to be good for domestic purposes, a number, especially when taken from old wells near the house or outbuildings, were badly contanimated with soakages of one kind and another and with sewage. The ground acts as a filter, purifying the water that passes through it, for a long time; but the time comes at length when, through saturation with filth, it looses its purifying power and the impure water makes its way into the well.

This fall, owing to the dry weather, the water in many wells is very low; and, consequently, there is a concentration of impurity wherever it exists. In numerous cases of sickness, we have been requested to analyse the water; in fact, during the last ten days, seven samples have been analysed and more are now on their way to the laboratory. While this class of work is of value to the individual for whom it is done, our work should be of a broader nature, devoted more to problems which underlie principles. I feel, therefore, that in justice to the work of the laboratory, general water analyses should be discontinued; and I would recommend that, in future, analyses be made only of water from cheese factories and creameries, and that applications from all other sources be referred to chemists who make a business of doing that class of work.

Soap Analysis. On March 9th, Mr. Geo. Fisher, Chief Inspector of San José Scale for Ontario, sent a sample of soft soap to the laboratory for analysis. This soap was afterwards used in large quantities in spraying for the scale, and gave good results where properly applied :

Moisture	75.02	Per Cent.
Combined fatty acids	12.44	"
Alkali (K_2O and Na_2O) in combination	2.62	"
Free Potash and Soda (K_2O and Na_2O)	.75	"
Unsaponified fat and free fatty acids	7.36	"
Alkali (K_2O and Na_2O) as carbonates, etc	1.81	"
Carbonates (CO_2)	not determined.	
Insoluble residue	None.	

The total alkali present in the above sample is 5.23 per cent., composed of K_2O 3.21 per cent and Na_2O 2.02 per cent.

Sorghum Ensilage. A sample of sorghum ensilage was sent to us from the farm of F. W. Hodson, Dominion Live Stock Commissioner, Myrtle, Ont., accompanied by a request that we determine its composition, so that a comparison of the feeding value might be made between it and corn ensilage. In the table given below, the average of a number of American analysis is included.

	Crude Protein.	Nitrogen-free Extract.	Crude fibre.	Crude Fat.	Ash.
Corn Ensilage, Average of 99 Analysis	8.0	53.0	28.7	3.8	6.6
Sorghum Ensilage, Average of 6 Analysis	3.3	64.2	26.8	1.3	4.4
Sorghum Ensilage, from Mr. Hodson's farm	6.9	57.6	25.5	3.8	6.2

These results show Mr. Hodson's sorghum to have been much richer in crude protein and crude fat than the American samples. This, however, is the result of only one analysis, compared with six. The sorghum was reported to have yielded fully one half more than the ordinary ensilage corns. For full particulars regarding yield of different varieties of sorghum, see report of Experimentalist.

A number of odd samples of substances were analysed, the results of which are not of sufficient importance to the public to record here.

Work with the Poultry Department.

At the request of Mr. Graham, Superintendent of the Poultry Department, we made an analysis of some foods which he was using in a feeding experiment. The table of analysis is given below, and the results of the feeding experiment will be found in the Report of the Poultry Department :

Analysis of Grains.

	Moisture.	Fat.	Crude Fibre.	Nitrogen Free Extract.	Total Protein.	Albuminoids.	Amides.	Ash.
	Per cent.	Per cent	Per cent	Per cent.	Per cent	Per cent	Per cent	Per cent
White Oat Dust	12.13	6.03	5.805	59.715	14.42	13.252	1.168	1.90
Oats coarsely ground	8.425	3.165	13.395	59.635	12.38	11.488	.812	3.00
Oats Kiln dried	9.92	2.15	14.56	57.765	11.595	10.894	.701	4.01
Pearl Oat Dust	13.35	5.20	4.10	63.51	11.99	10.45	1.54	1.85
Gluten Meal	2.235	7.97	5.13	59.53	24.36	.....	.....	.775

Work with the Experimental Department.

Last year, and again this year, the per cent. of sugar was determined in a number of sugar beets grown on the experimental plots. The varieties analysed were principally those grown for cattle food, but a few of those usually raised for sugar were included. The method of cultivation followed was similar to that practised on Ontario farms in raising roots for stock purposes. The object of the analysis was to obtain results which would make it possible to compare the feeding value of the beets upon a basis of the amount of sugar they contain and the yield in tons per acre. The percentage of sugar in the beets and the percentage of the solids which is pure sugar, are given in the following table. The yield of beets per acre will be found it the report of the Experimentalist, Part XI., of this volume. The per cent. of sugar found in the common large varieties of sugar beets was unusually high, due to the exceptionally fine weather of the past fall :

Per cent. of sugar in Sugar Beets grown for feeding purposes.

	Varieties.	Average weight of Tared Beets.	Per cent. Sugar in Beets.	Purity.
		oz.	Per cent.	Per cent.
1	Red Top	22.8	10.9	81.5
2	Red Skinned	20 5	9.6	78.4
3	White Silesian	15.7	14.5	86.9
4	New Danish Improved	21.2	11.4	81.6
5	Green Top White	21.4	13.6	83.2
6	Lane's Improved	13.1	11.6	80.9
7	Champion	18.8	9.8	74.2
8	Royal Giant	20.7	10.4	83.3
9	Giant Red Half Sugar	19.6	9.6	85.0
10	White French	16.8	14.4	83.5
11	Giant White Half Sugar	21.4	9.0	74.7
12	Pitzseheke's Elite	16.2	15.8	82.6
13	Jersey	17.5	15.6	88.7
14	French Yellow	16.2	13.3	85.2
15	Carter's Nursery	15.8	16.1	87.6
16	Improved Imperial	17.4	16.3	86.4
17	Imperial Grey Top	14.8	14.9	85.7
18	Queen of the Danes	15.4	13.3	84.8
19	Vilmorin's Improved	13.1	16.8	88.9
20	Kleinwauzlbener (seed from Wiarton, Ont., 1900)	18.3	15.2	88.0
21	Kleinwauzlbener (seed from Caro, Mich', 1901)	14.6	14 0	77.9
22	Kleinwauzlbener (seed from Scranton, Pa., 1901)	13 7	17.2	89.1
23	Kleinwauzlbener (seed from Aylmer, Ont., 1900)	18.7	17.5	89.8
24	Vilmorin's French Sugar	15.7	14.0	83.6
25	Mangold Kuaver	21.9	17.7	....

Work with the Dairy and Bacteriological Departments.

Last spring this department, in conjunction with the two above named departments, commenced a study of the effect of curing cheese in cold storage upon (1) quality of cheese, (2) germ life, and (3) the decomposition products of the nitrogenous matter of the cheese as compared with that from the ordinary method of curing. The work is not yet completed, so no definite results can be given.

Another line of investigation was undertaken by the three departments with a view to determine what causes the breaking down of the casein in the curing of cheese. Although cheese has been made and used for many centuries, this point is still in dispute. Some claim that it is the pepsin of the rennet, others that it is the lactic acid developed in the process of manufacture, and still others that it is brought about by a ferment found in the milk. It is evident that until we know more definitely what causes the breaking down of the curd, or casein, we cannot intelligently control the curing process. This work is nearly completed and will be ready for publication in a few weeks

For some time past cheesemakers have manifested much interest in the question of the advisibilty of washing tainted curds, and the consequent effect upon the quantity and

quality of the cheese. That tainted curds are improved by washing is practically established, but its effect upon the yield of cheese has not been so clearly proven. Prof. Dean has made a large number of experiments to clear up this point, a full account of which will be found in his report for the year.

Following up this line of investigation, we have determined the loss of casein and fat and the effect upon the acid when curds are washed. The plan of the experiment was as follows:

Eight hundred pounds of milk was carried through the ordinary process of manufactuae until immediately after milling, when the freshly milled curd was weighed and evenly divided, after which it was piled about 8 inches deep in the racks in the small experimental vats. One lot was at once washed with water at a temperature of 98° F., as many pounds of water being used as there were pounds of curd. The other lot was treated in the ordinary way. All of the drippings, including the wash water, was caught from both vats up to the time of salting. From this point to the time the cheese was taken from the hoops another collection was made of all the drippings and fat on cheese boards. In these different collections the amount of casein (N. × 6.25) and fat were determined. These results, figured to the loss per 1,000 pounds of milk, are given in the following table. The per cent. of acid with phenolphthalein as an indicator, was determined at milling and in the two separate curds at salting:

Loss per 1,000 Pounds of Milk.

Date of making.	Unwashed.	Washed.	Loss before salting. (grams)*		Loss after salting. (grams)		Total loss of casein and fat. (grams)	Loss due to washing. (grams)	Acid per cent.	
			Casein.	Fat.	Casein.	Fat.			At milling	At salting.
Sept. 26.....	"	..	22.31	56.7	73 81	47.20	200.02	....	1.017	1.259
" 26.....	.....	"	117.50	295.1	52.75	27.24	492.59	292.57	1.017	1.062
Oct. 4.....	"	.....	16 00	25.3	60.75	58 50	160.55	.....	1.062	1.323
" 4.....	....	"	lost.	225 0	50.60	28 00	.. ..	....	1.062	1.107
" 19. . .	"	.....	4.44	2.02	48.70	39.40	94.56	.....	.918	1.107
" 19.....	.....	"	70.60	170 40	44 06	36 00	321 06	226.5	.918	.936
" 26. ...	"	.....	6.50	17.30	99.40	71.40	194 6	... .	.936	1.260
" 26.....	. ....	.... .	65.00	313.70	49.20	55.10	483 0	288.4	.936	1.050

A study of the table shows clearly that before salting the greater loss, both of casein and fat, was sustained by the washed curd; but, after salting, the greater loss was with that which had not been washed. Taking the total loss, however, of these two substances, with the two different methods of treatment, we always find a greater loss where the curd has been washed.

The effect of washing upon the acid is very noticeable. In no case is the per cent. of acid at salting in the drippings from the washed curds as high as in that from the unwashed. In fact, it is very little higher than at milling. It is doubtful, however, if the acid in the inside of the cubes of curds is affected much; for the amount of acid in the cheese when taken from the press, measured by phenolphthalein indicator, has been practically the same wherever we have determined it.

From the results of Prof Dean's work in determining the effect of washing, and from the above, there appears to be very little doubt that when curds are tainted, or have developed too much acid, washing is beneficial; but that it is done at the expense of a slight loss in yield of cheese.

Sugar Beets.

The investigations regarding the suitability of parts of Ontario for the production of beets for the manufacture of sugar, have been continued this year. Besides analyzing

*453 grams equal to one pound.

the beets from the various experimental points throughout the Province, the results of which Dr. Shuttleworth is reporting, we have analysed over 100 odd samples. Some of these gave high per cents. of sugar; others, evidently from poor seed and poor cultivation, gave very poor readings.

The following results are given to illustrate the wide variation in the quality of these beets:

	Average weight of Tared Beets.		Per cent. of sugar in Beets.	Purity.
	lbs.	ozs.		
1.	3	2.7	8.9	74.6
2.	1	3.2	9.7	79.2
3.		13.8	9.6	73.2
4.	1	5.9	16.8	88.5
5.	1	2 7	16 6	89.8
6.	1	4.5	16.9	86.8

Although much interest is manifested in the sugar beet question, it is very evident from the samples sent in for analysis and from the questions asked, that growers have a great deal yet to learn regarding the importance of good seed and proper cultivation.

In a Province like Ontario, where agriculture is the leading industry, if the agriculturist prospers, the influence of that prosperity is felt throughout all the trades and professions. Because of this fact, the capitalist, the merchant, and the farmer are all interested in the sugar beet question, which is arousing so much interest throughout the country. If we may judge by the prosperous condition of the farmers and others, directly and indirectly affected in the districts in which this industry has become established, it would be a boon to this Province. The growing of sugar beets for factory purposes would not crowd out the live stock and dairying industries which have done so much for our farmers, but would supplement these, in that a good food is obtained as a bye product, and it would tend to force unprofitable grain growing more and more into the background.

Almost any soil that will grow good turnips or mangels will produce the right quality of beets. When grown on heavy clay soils, there is a greater difficulty in getting the young plants through the ground, and more labor in all the after work; but the beets from such soil are usually of high quality. When we consider the amount of labor involved in the cultivation and the quality in beets, we are forced to conclude that strong sandy or clay loams are likely to give the best results in beet growing.

While the best results are got from rich ground, coarse farm-yard manure should not be applied in the spring, nor any nitrogenous manure late in the growing season. As a special manure, possibly there is nothing better than wood-ashes. Sod plowed down in the spring is a poor preparation for this crop; for, like the coarse farm-yard manure, it tends to make the beets rooty and thus decrease the percentage of sugar.

The one great difference in growing sugar beets for cattle and for sugar factory purposes, is that in the former case they need not necessarily be mature, while in the latter, they must be as near maturity as it is possible to get them. As the beet matures, sugar accumulates in the root; consequently, the nearer the beet has reached to maturity when pulled, the higher is the percentage of sugar and the lower the percentage of solids not sugar; or, in other words, the purity is higher in well-matured roots. Both high per cent. of sugar and high purity are absolutely necessary in beets of good quality. This being true, it follows that everything that can possibly be done to hasten maturity should receive careful attention. It is for this reason that the method followed in the cultivation of roots for food purposes is departed from; and, instead, the rows are grown as closely together as it is possible to cultivate them (18 to 21 inches), and thinned to not more than 7 or 8 inches in the row. It has been said that the ideal way to grow sugar beets is in rows 10 inches apart and thinned to 10 inches in the row, thus leaving the

plants 10 inches apart each way. This method, however, would entail hand cultivation entirely. To allow as much as possible the use of horses in the work, the rows are placed a little farther apart and the beets thinned to less than 10 inches in the row, say 7 or 8 inches. The advantage of crowding them is that, being closer together, they are sooner forced to maturity.

Another essential in growing beets for sugar purposes, is that they be grown well in the ground. Nothing but the crown carrying the leaves should appear above the surface. This result is obtained by crowding the beets together. An illustration of the effect of crowding may be seen in any patch of beets, by observing the difference between the outside rows, or where blanks occur in the row and where the rows are full. That part of the beet which is above ground contains less sugar, and, besides, certain substances are present in it which decrease the amount of sugar that can be recovered from the beet; consequently, the factory men object strongly to any style of cultivation which tends to produce roots of this description.

The bright sunshine and dry weather of this fall have been very favorable for the growth of beets of the highest quality. Hence even the large beets, which, with ordinary fall weather, would be very low in sugar, are giving splendid results. If I mistake not, roots of all kinds are better for feed this winter than usual; for, while fodders deteriorate for feeding purposes as they mature, roots improve.

All that need be said here regarding the cultivation after thinning, is that possibly no crop responds so freely to thorough cultivation as do sugar beets.

The variety of seed used is a very important point; for, just as the best milking cows are the result of judicious selection, so the ability to produce a large amount of sugar of a high purity has been bred into certain varieties of sugar beets. In another part of this report, the results of the analysis of some 25 varieties of sugar beets grown in the experimental plots at the College are given. All these varieties had equal chances, but those in which the sugar producing tendency had been specially bred, contain, in some cases, nearly twice as much sugar as others. For yields per acre of these different varieties, see the report of the Experimentalist.

Those best informed and most interested in the growing of sugar beets, have long felt that beets of a very high quality could be grown in Ontario. Previous to the season of 1900, practically no united effort was made by any section of country to prove that beets of the right quality could be grown. An exception should possibly be made of the Owen Sound district, for there beets were grown more or less in the proper way and with the object of attracting capital to establish a factory. An analysis of some 40 lots from this section was made in 1898 and gave fair results, the best up to that time. Other than these, the beets sent were a very uneven lot, all grown from inferior seed and in the same manner as they would be for cattle food. In the the spring of 1900, a small sum of money was voted by the Legislature for the purpose of having thorough and reliable tests made of a few sections of the Province. Aylmer, Welland, and Newmarket were the districts selected for the first tests. About fifty experimenters in each district, whose plots had been inspected and approved, were supplied with seed and full directions regarding methods of cultivation. To encourage thoroughness and close adherence to rules in cultivation, prizes were offered. Inspections were made from time to time during the summer and marks awarded for cultivation as well as for the per cent. of sugar and yield of beets. The following were the results obtained from the last analysis of the season at the three experimental points.

	Per Cent. Sugar.	Purity.
Aylmer	13 9	86 8
Welland	14 4	84 9
Newmarket	15.–	84.1

Last spring fifteen different districts made application to the Government for a thorough test to be made of the suitability of their soil for the production of beets for sugar purposes. Because of the increased number of sections to be tested, it was found advisable to decrease the number of experimenters in each place to 25. The plan of the experiment was similar to that of the year before, but where prizes were offered they were contributed by the municipality in which the test was made.

The following are the results of the various experiments :

	Per Cent. Sugar.	Purity.	Yield per Acre.	
			Tons.	Lbs.
Alvinston	15.19	86.1	21	876
Belleville	15.7	88.8	16	1,725
Clinton	14.8	86.7	16	662
Cayuga	16.2	88.2	14	1,665
Dunnville	15.13	88.15	15	523
Lindsay	16.4	83.7	15	131
London	15 6	88 1	17	59
Mount Forest	15 6	86 7	19	500
Port Perry	16.6	89.3	15	156
Peterboro'	17 3	90.6	16	180
Walkerton	15.4	88 0	18	1,701
Whitby	15.8	89.1	22	83
Berlin	14.6	85.8	18	1.398
Waterford	15.3	86 5	17	317
Simcoe	14.5	86.6	14	610
Average	15.61	87.49	17	495

The cost of producing an acre of beets, as estimated from the actual figures reported by last year's experimenters, was $26 per acre. This includes rent of land, seed, cultivation, etc., but not hauling to the factory.

Under the Act passed by the Legislature last session, the farmer will be paid $4 a ton for all sugar beets delivered during the first year in which the bounty will operate. On this basis, the gross income at Whitby would be over $88 ; and if the cost of cultivation, etc., (say $26) is deducted, there will be a net profit of about $60 per acre. The lowest average reported in the experiments was at Simcoe, 14 tons 610 pounds to the acre ; but, even with that yield, the profit would be above $30 to the acre. Furthermore, according to the Act, during the second and third years of the bounty, the factories must pay 33⅓ cents per ton for every 1 per cent. of sugar over 12 On this basis, the Peterboro' experimenters would receive $5.76 per ton, and the Simcoe farmers, whose average of sugar was the lowest this year, would receive $4 83 per ton, instead of $4, which would increase the profits very materially.

Colorado is considered the best State in the Union for the production of sugar beets of high quality. The following table and quotation is taken from the Colorado State Agricultural College Bulletin, No. 51, on "Sugar Beets in Colorado in 1898 " The table gives the average results of a number of analysis in ten different counties :

Average results by Counties.

County.	Gross weight of trimmed beets per acre.	Sugar in beet.	Purity.	Factory value per acre.
	Tons.			$ c.
Conejos	19.53	15.67	80.0	79 11
Costilla	14 05	15.42	84 3	56 92
Delta	22.54	14 74	80 0	86 23
Fremont	23 36	16.87	84 1	99 75
Garfield	18 96	16.12	84 8	76 98
Larimer	25.32	15 52	80.2	102 56
Logan	17.80	14.09	77 3	64 00
Mesa	20.90	15 22	77.9	79 90
Otero	22.59	15 14	79.8	86 40
Weld	13.98	15.89	79.8	56 70
Average	19.90	15.47	80.8	76 07

" In considering the foregoing table, one is struck at once with the high average excellence of the sugar beets in Colorado as regards both quantity and quality. In the districts of the United States where beets are raised for factories, 12 per cent. of sugar

and 78 purity are considered standards, and one who has raised 10 to 13 tons of beets to the acre is thought to have done well. A fair estimate of the cost of raising sugar beets is $30 per acre, while the above table gives $76.07 as the average factory value for the whole state. The difference of $46.07 profit per acre will compare well with any other kind of farming practised in Colorado, not even excepting the famed cantaloupes of the Arkansas valley, the orchards of the western slope, or the lambs of the northern feeding districts."

It is evident, from a consideration of the above, that if Colorado is an exceptionally fine state for the production of sugar beets of a high quality, Ontario may also be classed as a good sugar beet producing country. As has been stated, this fall has been a very favorable one for maturing beets, and this year's results are higher than they will be with average years; but we must also remember that these are only experimental results and not what can be done when land is specially prepared and the cultivation better understood.

Of course, these experiments are not conclusive proof that a great beet sugar industry will be developed in this Province; but they show that, with careful attention and a continuity of purpose on the part of the farmers, they should be at least a very profitable crop.

In conclusion I wish gratefully to acknowledge the hearty co operation of the Dairy and Bacteriological Departments in all the work in which we have been associated during the year.

Respectfully submitted,

R. HARCOURT,

Professor of Chemistry.

PART VI.

REPORT OF THE PROFESSOR OF VETERINARY SCIENCE.

To the President of the Ontario Agricultural College :

SIR, —Allow me to submit my report for 1901.

CLASS ROOM.

The class room work was much the same as usual, except that I endeavored to make the course more practical, and did not take up as much time as usual with the study of anatomy.

First Year Lectures and demonstrations to the first year consisted in a course on the anatomy of domesticated animals, especially that of the horse, noting points where essential differences exist between his anatomy and that of the other classes of stock. This course included a brief study of the skeleton, joints, muscles; digestive, respiratory, urinary, and generative organs; also the circulatory and absorbent systems, the eye, skin, and foot. I also gave a course of lectures on the building of stables, the location, material used, size and arrangement of stalls, both open and box, ventilation, drainage, etc.; likewise the general care of horses, as regards feeding, watering, grooming, exercising, etc, and the care of saddlery, harness, and carriages. In addition to the above, I gave a course of lectures on judging horses. In this work we labor at a disadvantage in not having the different breeds and classes well represented I select, for demonstrations, the best we have, borrow some and supply some from my own stable. During the winter term, I delivered

to this class a course of lectures on Veterinary Materia Medica, in which I spoke of the general action of the medicines and the different modes of administration and application, with the advantages and disadvantages of each. We considered individually the properties, actions, uses and doses of the drugs commonly used for the prevention and cure of the ordinary diseases to which farm stock is subject.

Second Year The class room work for this year consisted in the consideration of the causes, symptoms, and treatment (both preventive and curative) of the ordinary diseases of farm stock, with frequent reference to the proper mode of feeding, watering and general care of stock, in order to prevent disease. During lectures, I usually have one of my own horses in the class-room and explain the different appearances of a diseased and a healthy animal; and in speaking of the diseases of the bones, joints, muscles, feet, skin, etc., I point out on the healthy animal the seat of disease and explain the change in appearance produced. I also have specimens of diseased bones, and am thereby able to show the class the change of structure that takes place. I gave a course of lectures on Veterinary Obstetrics, speaking of the general care of females during pregnancy and after parturition, noting the diseases of both dam and offspring, incident to the parturient state, and giving special attention to the care of the young. As far as possible I illustrate these lectures with charts. A course of lectures called "Practical Horse" was also given, in which I demonstrated with a living horse the best methods of securing an animal for minor operations, such as opening abscesses, dissecting out tumors, dressing and stitching wounds, and firing for spavin, ringbone, and kindred diseases; the different methods of castration, etc. I illustrated the methods of administering medicines, dressing teeth, scarifying lampas, etc., passing a probang into an ox, and puncturing an ox in case of excessive bloating, etc. In addition to the above, I gave instructions in judging horses, using those we have on the farm and in my own stable, borrowing some and taking the classes to the farms and stables of local breeders.

Third Year To this class, I gave lectures on the different breeds of horses and upon judging horses. To the special dairy class, I gave a short course on the causes, symptoms, and treatment of the ordinary diseases to which dairy stock is subject.

Diseases and Ailments of the Stock.

Besides class room and practical work, I gave professional attention to all the stock belonging to the institution, and am pleased to be able to state that the losses were few. Below will be seen particulars.

Horses. We had several cases of colic, acute indigestion, influenza; lymphangitis, sore necks and shoulders, calks, bruises, wounds, eczema, lameness, &c., all of which recovered.

Cattle. We had three cases of parturient apoplexy in cows, one of which was fatal, several cases of retention of the placenta, inflammation of the udder, sore teats, obstruction of the milk ducts, indigestion, impaction of the rumen, impaction of the third stomach, etc We had also a few cases of difficult parturition, several cases of uterine discharge following parturition (and in one or two instances abortion), which I treated successfully by administering carbolic acid in from 20 to 30 drop doses three times daily. We had some diarrhoea in calves, and lost one in the dairy herd from this cause. With the exception of the fatal cases mentioned, all the above made good recoveries.

Sheep The only losses we had in sheep were two or three lambs from wool balls in the stomach, and one ewe from inflammation of the womb.

Pigs We had little trouble with the pigs and lost none, except a few newly born ones.

I have, Sir, the honor to be

Your obedient servant,

J. H. REED,
Professor of Veterinary Science.

PART VII.

REPORT OF THE PROFESSOR OF DAIRYING.

To the President of the Ontario Agricultural College :

SIR,—This eleventh annual report of the department of Dairying will deal with the Dairy School, dairying as taught to the College classes, experimental work relating to cheese and butter making, and miscellaneous notes relating to the dairy herd, improvements, milk supply, etc.

There were two sessions of the Dairy School in 1901. The regular course commenced January 2nd, and closed March 22nd. The Creamery course began December 2nd and will close December 21st. For all courses there were registered 80 students. Of these 65 students registered for the factory and farm dairy courses from January to March. The attendance at the special class for creamery buttermakers was fifteen. During the year, fourteen ladies took dairy work, of whom two passed all the examinations for the factory course. The remainder took the farm dairy and creamery course, of whom seven passed the final examinations in the farm dairy. Altogether there were 31 who registered for the farm dairy and special work. For the full factory course, 34 registered.

In addition to the regular work done in other years, practical work in Dairy Chemistry and Dairy Bacteriology was added. The branch proved very interesting and helpful to the classes. These two sciences require more emphasis in all dairy training. Our dairy classes yet need more practical instruction in the handling of boilers and engines, placing of shafting, pulleys, belting, etc. Our milk supply has also been inadequate for thorough practical instruction in the manufacture of butter and cheese. We expect a larger supply for the coming year. During the creamery course in December, one of the churns was used for churning the cream delivered by the patrons who separate their cream on the farm, usually with a hand separator. The cream is measured and tested according to the rules adopted by cream-gathering creameries in the Province. While it is not nearly so convenient a method as the Babcock test, we have adopted the "oil test," because nearly all the cream-gathering creameries use this method of dividing proceeds among their patrons. Students who operate such creameries will thus be given practical training along the lines they will meet with in operating cream gathering creameries.

Forty one students wrote on the final examinations in March, which is the largest proportion of registered students we have ever had. While the attendance is not so large as it was a few years ago, our students remain with us for a longer time, and we are able to do more for them. The value of the work done by a Dairy School cannot be measured wholly by the number of students in attendance.

For 1902, we have added a special course of demonstrated lectures in Home Economics, or what is commomly known as Domestic Science. This promises to be a very interesting and helpful branch of the Dairy School, especially for ladies. Any system of agricultural and dairy education which neglects, or overlooks, the training of good homemakers is deficient.

Those applying for diplomas in 1901, are: Peter Callan, Drumbo, Ont. (cheese); Thos. F. Boyes, Lambeth, Ont. (cheese); J. R. Hutchison, B. S. A, St. George Ont. (cheese); G J. Immel, Grafton, Ont (cheese); Wm. McKay, Courtice, Ont. (cheese); J. R. Nesbitt, Shoal Lake. Man. (butter); A. J. Wagg, B. S. A., (butter) ; W. E. Witt, Moosomin N. W. (butter).

The first year students of the college are given a full course of lectures relating to the dairy cow,—her breeding, feeding, care and management, in order to get the best results; the care of milk for cheese factory and creamery ; town and city milk and cream trade; testing milk with the Babcock milk-test and lactometer ; the creaming of milk by gravity and centrifugal methods ; the ripening of cream ; churning, salting, working, and preparing dairy butter for market ; and the judging of butter. In addition to the lectures, all first year students work one afternoon each week during October and November, in the Farm dairy,—testing milk, running cream separators, setting and skimming milk, ripening cream, churning and preparing butter for market according to the most approved

methods. So far as we know, the first year students who take this work are not lacking in opportunity to know all that there is to be known about the science and practice of dairying on the farm. The time for practical work in the afternoons could doubtless be extended with profit, if the college course permitted an extension.

The second year class receive a course of lectures on co operative dairying, including all phases of factory butter and cheesemaking. The construction of dairy buildings ; dairy machinery ; formation of joint-stock companies ; manufacture of condensed milk ; judging and marketing of butter and cheese ; value of dairy by-products (skim-milk, buttermilk, whey), etc.; all these are fully dealt with.

The practical work of the second year includes the special creamery course, and some work in cheesemaking. There is not so much practical work as there ought to be for the second year.

Specialists in dairying of the final year study two text-books, and spend as much time as possible in practical work in the Farm dairy, College creamery, and cheese factory. More time should be given to scientific investigations along practical lines in the final year of students who are specializing in dairying.

EXPERIMENTS IN CHEESEMAKING.

Care of Milk for Cheesemaking.

The importance of this question, and the great diversity of opinion as to the best methods of caring for milk, is our reason for continuing this work year after year. We hope to continue it until we have more exact data. Each year brings new conditions of atmosphere, new cows, new methods, and new men ; hence, it is only after a number of years' experiments that we can hope to reach definite conclusions on this important part of cheesemaking.

The experiments of the last year were made chiefly in the month of August, and with milk from our own herd. There were two groups of experiments. In No. 1, half of the night's milk was cooled to a temperature between 60 and 70 degrees, with as little stirring as possible. The other half was aërated and cooled, but not to so low a temperature as the unaërated. It was found that aërating without cooling was not satisfactory, as the milk was over-ripe the following morning. In the aërated lots, the morning's milk was also aërated before mixing with the night's milk. In No. 2, one-half of the night's milk was stirred and cooled to about 50 degrees, and from three-quarters to one per cent. of culture was added after the milk was cooled. The other half was cooled to about the same temperature, viz., 50 degrees, but no culture was added to it.

The quantity of milk used in each lot was about 300 pounds, testing from 3.5 to 3.6 per cent. fat. The average minimum temperature of the night air during the experiments was 53.6 degrees. The average morning temperature of the aërated lots of milk in Group 1 was 67.5 degrees, and of the unaërated was 64 degrees. The average degree of ripeness, as measured with the dram rennet test, was 25 seconds for the aërated milk, and 27.6 seconds for the unaërated. In other words, the unaërated and cooled night's milk was sweeter the following morning. The yield of cheese was slightly greater from the lots unaërated, while the loss of weight in curing was 4.90, and 4.86 per cent. respectively for the aërated and unaërated lots.

The average score for flavor was 34 out of 40 for the cheese made from the aërated milk. The average score of the unaërated lots was 34.33. The total average score was 88.11 for the aërated lots, and 88.44 for the unaërated. The results are similar to those obtained in previous years.

In Group 2, where the milk was cooled to 50 degrees and culture added at night, the average rennet test the following morning was 29.2 seconds. The average rennet test of lots cooled to 50 degrees, but to which no culture was added, was 37 2 ; in other words, the latter was much sweeter.

The yield of cheese was about two per cent. greater from the lots cooled without the addition of culture at night, and the cheese from these lost about .3 per cent. less while curing. Both lots scored an average of 35 for flavor. The average total score was 89.5 for the lots which were cooled to 50 degrees, and to which culture was added at night, and the score was 90 where cooling to 50 degrees without culture was practised.

Conclusions :

1. Aëration of milk without cooling below 70 degrees is not sufficient to prevent milk from becoming overripe during the night in hot weather.

2. Cooling night's milk to a temperature below 70 degrees is necessary in order to have the milk reach the cheese factory in a condition suitable for the manufacture of good cheese.

3. Cooling to 50 degrees and the addition of a culture to control flavor has not yet proved entirely satisfactory.

Variations in Methods of Making Cheddar Cheese.

To determine what effects on yield and quality of cheese would be produced if lower setting and cooking temperatures, combined with an extra quantity of rennet, were adopted, twelve experiments were made during May and July. From 600 to 1,500 pounds of milk, testing an average of 3.46 per cent. fat, were thoroughly mixed in a vat. The milk was then equally divided between two vats. One vat was heated in the ordinary way by the addition of $3\frac{1}{3}$ ounces of rennet for 1,000 pounds milk, added at a temperature of 86 degrees and the curd cooked to 98 degrees. To the other vat was added rennet at the rate of 5 ounces per 1,000 pounds milk, at a temperature of 82 degrees, and the curd was cooked to 94 degrees instead of 98 degrees.

Results :

1. Both vats coagulated in about the same length of time, and both were about the same time in developing sufficient acidity for removal of whey.

2. The vat of milk set and cooked at the lower temperatures had about the same per cent. of acidity when dipped, but at milling and at salting it contained considerably more acid than the normal vat—.756 and .993, as compared with .709 and .951. This extra acidity was apparently in the cheese, as most of the cheese made by setting and cooking at the lower temperatures showed too much acid when cured and were "short" in the texture.

3. The gain in yield of cheese was a little over one pound per 1,000 lbs. milk by setting and cooking at the lower temperatures. In curing, the normal curd lost 4.62 per cent. and the others lost 4 74 per cent.

4. The cheese made in the usual way scored higher in flavor, color, and texture. The average total score was 89.5 for the normal cheese, and for those made with extra rennet and lower temperatures it was 88. On July 23, two cheese were made according to these methods, and placed in cold storage. Both were fine cheese when scored on October 24th, and there was a gain in weight of $\frac{3}{4}$ lb. cured cheese, from 600 lbs. milk by using more rennet and adopting a lower temperature for setting and cooking.

Conclusions : The use of an extra amount of rennet and the adoption of lower temperatures than is customary for renneting and cooking gave an increased yield of cheese, but as cured in an ordinary curing room it developed too much acid, and the quality was inferior. In the one trial where cheese were cured in cold storage, the quality of the cheese was equally good, and there was a gain in the amount of cheese produced equal to about one and a quarter pounds per 1.000 lbs. milk. This is no small item in a factory handling 20,000 to 30,000 lbs. of milk daily. The matter is of sufficient importance to warrant further investigation.

Washing Curds.

Some twenty experiments were made in July and August, which were a continuation of those conducted last year. Twenty thousand pounds of milk, testing an average of 3.51 per cent. fat, were used. The quantity of milk used in each experiment was from 800 to 1200 pounds. In September and October. some further experiments were made, more especially to see the difference in loss of soluble matter by washing. These latter experiments will be reported upon by the College chemist, as they were made under his direction.

The experiments were made in three series. In Series I, the curds were equally divided after milling, and one half of the curd was washed with a quantity of water equal to

the weight of the curd and at a temperature of 98 degrees. The curds not washed produced 423 75 pounds green cheese and 407.5 pounds cured cheese. They lost 3.83 per cent. in four weeks, while curing. The washed curds produced 419 75 pounds green cheese and 403 pounds cured cheese. They lost 3.99 per cent. in curing.

In Series II. the curds were equally divided after milling, and one lot was washed with a quantity of water at 98 degrees, equal to twice the weight of the curd. The other half was unwashed. The yield of green cheese from the unwashed lots was 492 5 pounds, and from the washed lots the yield was 488 pounds. The cured cheese was 475.5 and 470.5 pounds respectively. The lots unwashed lost 3.45 per cent. in curing, and washed lots lost 3.58 per cent. in curing.

Series III. consisted of four experiments, in which a vat of milk containing 1,200 pounds was thoroughly mixed. It was then divided into two equal parts and both were handled exactly alike, so far as possible. The 2,400 pounds milk, the curds from which were unwashed, produced 215.75 pounds green cheese and 209 pounds cured cheese. The curds from the same quantity of milk washed with twice their weight of water at 98°, produced 224 pounds green cheese and 206.75 pounds cured cheese.

These cheese were scored by Messrs. Bell, Muir & Steinhoff on September 21st. The table shows the average of the three judges' scorings :

Table showing the score of the cheese made from unwashed and washed curds.

Kind of Cheese.	Av. Flavor (Max. 40)	Av. Closeness (Max. 15)	Av. Color (Max. 15)	Av. Texture (Max. 20)	Av. Total (Max. 100)
Series I.					
Unwashed.....	32.24	13.87	13.80	15.59	85.48
Washed with an equal quantity of water at 98°.	32.22	13.90	13.85	16.03	86.
Series II and III.					
Unwashed	31 34	13 80	13.62	14.95	83.71
Washed with twice the weight of water at 98 degrees.....	30.71	13.71	13.75	15.00	83.17

Conclusions :

1. Washing curds in the experiments of 1900 and in 1901 caused a lessening of the yield of cheese. The loss during the past year was equal to about one pound cured cheese per 100 pounds curd.

2. In the four trials where milk was equally divided, the loss of cured cheese was 2.25 pounds for 2400 lbs. milk.

3. The average score of the cheese in Series I was .52 of a point higher from the washed lots, and in Series II and III, the unwashed lots scored an average of .54 of a point higher, so that we may conclude there was little difference in the quality of the cheese.

4. The practice of washing curds should be the *exception* and not the rule, as it wastes cheese producing material.

Light vs. Dark Curing-Room.

During May and June, 16 experiments were made to determine the effects of light and darkness in curing cheese. From 600 to 800 lbs. milk, containing an average of 3.46 per cent. fat, was made into cheese according to our usual methods. After salting, the curds were evenly divided and put into two hoops. When taken from the press, one was put into a well lighted room, and the other was placed in a dark room. As far as possible a uniform temperature and moisture content were maintained in both rooms. The

average temperature of the dark room was 66 degrees and the average per cent. of moisture was 76.4. The average temperature of the light room was 64.6°, and of moisture 79 3. Both rooms were ventilated and cooled by means of a sub-earth duct. The cheese moulded about the same in both rooms, unless sprayed with formalin.

The cheese cured in the dark room lost 4.26 per cent. in weight during one month Those cured in the light room lost 4.23 per cent., practically the same. The average score in flavor was 36.16 in the light room and 36.26 in the dark room. In the other qualities, there was little or no difference. The total average score was 91.69 in the dark room, and 91.84 in the light room.

Conclusion: Under the conditions named in these experiments, there would seem to be little difference between the loss of weight in curing, and in the quality of the cheese, whether cured in a light or in a dark room, if temperature and moisture are about the same in both rooms. The amount of mould on the cheese was also about the same in both rooms.

Curing Cheese in Cold storage.

A series of experiments were conducted during the past season to determine the effects of curing cheese in cold storage in different stages after being made, as compared with curing in an ordinary curing room kept at about 65 degrees. The plan of the experiment was as follows:

Fifteen hundred pounds of milk were made into five cheese. One of these cheese was put directly into cold-storage at a temperature of 40° when taken from the hoop. The other four were put into our ordinary curing room. At the end of one week, one. of these cheese was placed in the cold-storage; at the end of two weeks, another was put in; and at the end of three weeks, another. The fifth cheese was cured in the ordinary way at a temperature of about 65 degree, as stated above.

The loss in shrinkage and the quality of the cheese were ascertained by the Dairy department. The bacterial content, and the chemical changes were studied by the Bacteriologist and the Chemist at the College.

The full details of the experiments will be published in bulletin form before the opening of another cheese season, as many of the cheese are not yet ready to be reported upon.

We may anticipate these results by saying that, so far as the work has gone, it indicates that cheese may be cured at a temperature of 40 degrees, in about three to four months' time, and that the quality of cheese cured in cold-storage is superior to that cured at ordinary temperatures. The results also indicate that the sooner the cheese are placed in cold-storage after being made, especially in hot weather, the better the quality of the cheese, and the less loss by shrinkage. Cold-storage for dairy products is evidently a very important factor in securing an improved quality of goods.

EXPERIMENTS IN BUTTERMAKING.

1. Butter Cultures.

It is unfortunate that our butter and cheese-makers have adopted the use of the word "starter" when speaking of that which is put into cream or milk to improve the flavor developed during ripening. A "starter" is something that starts the ripening of the cream; but that which we add to the milk or cream must do more than "start" ripening, or it will fail in its object. It must control, refine and improve the quality of the product. Hence we prefer the use of the term "culture" rather than "starter."

Three series of experiments were carried on during the year. The first related to the effects of different amounts of culture added to the cream for ripening purposes; the second was made to determine the relative value of propagations made from different pure cultures; and the third compared a pure culture made from pasturized skim-milk with one made from a mixture of whole milk, skim-milk and buttermilk.

In Series I., five, ten, fifteen, twenty and twenty-five per cent. of culture was added to the cream. The main points in the experiment are shown in the following table:

Per cent. culture added to the cream.	Number of experiments.	Weight of milk	Av. per cent. fat in milk.	Av. per cent. fat in cream.	Per cent. acid in cream when churned.	Av. temp.		Average time churning.	Average time ripening.	Average score for flavor.	Average total score.
						For ripening.	For churning.				
		Lbs.				°	°	Mins	Hrs.	Max. 45	Max. 100
Five	5	6,063	3 70	30.8	.592	63	47.8	42	15 6	42.2	97 2
Ten	5	6,641	3 72	32.2	.593	65	48	43	11 0	41.6	96.6
Fifteen	5	7.760	3.:0	27 9	.610	68	48	45	9 5	42.0	97.0
Twenty	5	5.277	3 67	28.9	.583	67.4	47.8	37.7	8 0	41.2	96 2
Twenty-five	5	6,567	3.72	29.1	.582	68.4	48	39.0	5.3	41.2	96.2

In Series II. and III., cultures made from pure cultures obtained from the College Bacteriological Laboratory were compared with cultures from the O. Douglass Co, of Boston, Mass, from Conn's B 41 Co., of Philadelphia, and with cultures made by mixing whole milk, skim-milk and butter-milk, using the O. A. C. pure culture for the ferment.

The main points are brought out in the following table of results:—

Kind of culture.	Number expts.	Pounds milk.	Av. per cent. fat in milk.	Av. per cent. fat in cream.	Av. per cent acid in culture	Av. per cent. acid in cream when churned	Av. per cent. culture used in cream.	Av. temperature for ripening.	Av. temperature for churning.	Average score for flavor.	Average total score.
								°	°	Max. 45	Max. 100
O. A. C	15	20,085	3 6	28 2	.759	.599	17 4	65 5	48	41.80	96 8
Douglas	15	19,463	3.6	28 0	787	.609	16 3	66	48	41 06	96.0
O. A C	3	4 536	3 7	27 5	.....	.580	15 0	70	52	40.6	95 6
B 41	3	4,536	3 7	27.5	.....	598	15 0	70	52	41 3	96 3
O. A. C	6	7.047	3 57	27 5	.....	.567	14 1	66.6	49	40.8	95.8
Mixed culture	6	7,047	3.57	27 5	.....	.567	14.1	66.6	49	40.8	95 8

Summary:

1 To ripen the cream with five per cent of culture required fifteen hours, whereas twenty-five per cent. culture ripened the cream in about five hours.

2. The highest average score for flavor in the butter was obtained by ripening at a lower temperature, with a small per cent. of culture, and taking a longer time to ripen the cream.

3 Comparing O A. C. and Douglass cultures, there was very little difference in the results. The average score for flavor of the butter was slightly higher in those lots made by using the O. A C culture.

4 The "B 41" culture gave a slightly higher score for flavor than did the lots made by using the O. A. C. culture, though the scores were not quite so high as in the previous series.

5 A culture made by using the O. A C pure culture in equal quantities of whole milk, skim-milk and butter milk did not give any better results than the use of this culture in pasteurized skim-milk, which is our usual method of preparing a culture.

2. Moisture and Salt in Butter.

Considerable interest is now being taken in the question of the moisture and salt content of butter. From April to August, a series of experiments were made to ascertain the effects of different methods of treating butter on the amounts of moisture and salt retained by it.

The points investigated related to: temperature in churning; size of butter granules; temperature of washing water; washing once and twice; salting at rates of one ounce, three-quarters ounce, one-half ounce, and no salt; working once, twice, and three times; and the effects of pasteurization at different temperatures compared with non-pasteurizing.

The samples of butter were taken immediately after the final working. From three to four grams of butter were placed in a shallow tin dish and dried for from eight to ten hours, or to a constant weight, in a drying oven. The salt was determined with a standard silver nitrate solution in which one c.c. of the silver nitrate was equivalent to .005 gram of sodium chloride.

The method of adding one to one and a half c.c. of alcohol to the samples, as recommended by Richmond, and weighing at the end of two hours did not prove satisfactory.

Results of Experiments in Amoun s of Moisture and Salt in Butter.

Kind of Butter.	Average per cent. of Moisture.	Average per cent. of Salt.
Butter churned at 44°-48°	13.678	2.24
" " 54°-58°	13.588	2.34
Butter in fine grains	12.933	1.72
" size of wheat grains	13.223	2.39
" " corn "	14.207	2.93
" in lumps	12.542	2.56
" washed with water at 40°-48°	13.052	2.23
" " " 50°-60°	13.289	2.35
" " once	12.648	2.00
" " twice	12.513	1.81
" salted one ounce to pound	13.470	3.43
" " one-half ounce to pound	13.141	2 52
" " three-quarter ounce to pound	14.058	2.60
" without any salt	12 940	....
" worked once	12.410	2.59
" " twice	12.666	2.21
" " three times	10.740	2.10
" from milk unpasteurized	13.690	2.15
" " pasteurized at 140°	13.128	2.57
" " " 160°	13.224	2.85
" " " 135°	13.994	2.55
" " " 195°	13.561	2.62

Summary:

1. There was very little difference in the average moisture and salt content of butters churned at temperatures between 44 and 58 degrees.

2. Butter churned into lumps had the lowest moisture content, and that in fine grains the lowest salt content. The lots churned into the size of corn grains had both the highest moisture and highest salt content of any in the series.

3. The moisture and salt content was about the same when washed with water at temperatures between 40 and 60 degrees. The same is true of samples washed once and twice, other conditions being equal.

4. Butters unsalted contained the least moisture and those salted at the rate of three-quarters of an ounce per pound of butter contained the most moisture. The salt content of the finished butter does not appear to have any constant relation to the amount of salt added to the butter. On the average, more than half the salt applied to the butter passed off in the working. In some determinations of the moisture pressed out by working, it was found to contain from 23 to 24.5 per cent. salt.

5. We are unable to explain why the samples worked twice contained slightly more moisture than did similar lots worked once. Similar results were obtained last year. In both years the butter was given the same number of revolutions with the Simplex worker, whether worked once or twice, and both workings were given the same day, but about

three hours apart, *i. e.*, one half the amount of working was done, then the second half was done about three hours after the first. The third working reduced the moisture content nearly two per cent. This third working was made the day after the first two workings had been given.

6. The butters made from unpasteurized milk had a higher percentage of moisture than those made by pasteurizing at from 140 to 160 degeees, less than the lots pasteurized at 186 degrees, and about the same as those made by heating the milk to 195 degrees before separating.

3. Pasteurization of Milk at Different Temperatures.

A series of experiments, in continuation of those conducted in previous years, was carried on this past year, chiefly to determine the effects of different pasteurizing temperatures, between 140 and 200 degrees, on the bacterial content of milk, and upon the quality of the butter. A joint bulletin by the Dairy and Bacteriological departments has been published giving the results of these experiments.

Briefly, the results indicate that a temperature of 180 to 185 degrees is very favorable in reducing the bacterial content to a low point, and this temperature also adds keeping quality to the butter. If we wish to establish a good reputation for Canadian butter in the British markets, we shall have to adopt pasteurization; and if we wish our butter to retain its fine flavor for some time, we shall do well to pasteurize at a temperature of 180 to 185 degrees. In our experiments, the whole milk was pasteurized before separating and the skim-milk was run over a water-cooler before it was returned to the patrons. We found that this plan enabled us to send to the farmer a good quality of skim-milk for feeding purposes.

4. Miscellaneous.

Turnip Taint. In October turnip tops were fed to our cows along with "Virginia Cattle Food," to determine whether the addition of this "food" would destroy the turnip flavor. We did not have sufficient food to continue the experiment more than five or six days; but so far as we could judge, the milk was free from any taint of turnip. The butter, however had quite an objectionable flavor, though it was not "turnipy." This may have been due to the fact that the milk was not pasteurized, which is our usual custom.

Columbia Air Churn. Several tests of this churn were made during the year. Our general results were that the butter may be churned in the Columbia in less time than in a barrel churn, if the operator will exert himself sufficiently. Otherwise, there is no advantage as compared with the barrel churn. The tests of buttermilk for fat were usually higher from the Columbia, though there was little or no difference in the yield of butter. The quality of the butter was slightly inferior from the Columbia.

Testing Cows. Several "official tests" of pure-bred Holstein cows have been made under our supervision at the farms of owners. As several of the breeders of other cattle have established, or are about to establish, "official tests," it may be necessary in the near future to have some one permanently connected with the Dairy who can be relied upon to do this work. At present we secure the services of reliable graduates of the Dairy School, or College, to undertake the work.

Milk Supply for Experimental Work. We have had an average of about 3,000 lbs. milk daily for experimental purposes during the past season. This has enabled us to do more and better work. A number of farmers in the neighborhood were induced to supply us with milk, by our guaranteeing them 20 cents per lb. fat in the milk for the season, if they sent the entire season. Most of those who commenced and have continued the whole season are pleased with the results. We are aiming at a supply of 5,000 lbs. daily throughout the year for the Dairy School, and for the experimental work in the Dairy.

We adopted the plan of sending a circular letter monthly to each patron, enclosing it with his statement showing the pounds of milk delivered and the amount of money due him. The following are copies of the letters sent for the months of July, August, and September:

TO THE PATRONS OF THE COLLEGE DAIRY.

The amount of milk delivered by you now has dropped to about one-half what it was in the month of June. This indicates that your cows are not being fed so liberally as they were last month. Cows worried

with flies will not milk so well. We urge upon you the importance of keeping up the flow as much as possible for the next month, as we shall pay you *21 cents per pound of fat in August.* Therefore it is in your interests to send as much milk as possible.

Do not forget to strain the milk immediately after milking. Then set the can of milk in cold water and stir the night's milk until it is cooled below seventy degrees. If you will send us sweet, clean milk, we shall be able to return you skim-milk in good condition. We shall be glad to have you report the fact if the skim-milk does not reach you sweet. The cans of the skim-milk should be set immediately in cold water on their return to the farm. Sweet skim-milk is worth 15 to 20 cents per 100 lbs. for feeding young stock. Sour skim-milk is worth as much for feeding the grown pigs you are fattening.

Tests and Values per 100 lbs for July, 1901.

Names of patrons.	% fat.	Cents.	Names of patrons.	% fat.	Cents.
Dairy Herd	3.5	70	Mr. Hamilton	3.5	70
Mr. Hesketh	3.6	72	" Dickson	3.7	74
Farm Herd	3.4	68	" Gordon	3.6	72
Mr. Tolton	3.4	68	" Atkinson	3 7	74
" Byrne	3 4	68	" Phil ips	3.5	70
" Graham	3 5	70	" Jefferson	3.7	74
" Thompson	3.6	72	" Lamb	3 5	70
" Mc Dougall	4.4	88	" Starkey	5.8	106
" Clair	4 0	80	" W J. Laing	3.4	68
" Moore	3.6	72	" Peter Laing	3 5	70
" Lewis	3 5	70	Miss R. Laing	3.7	74
" Walsh	3 3	66	Mr. Roberts	3.5	70
" McNulty	3.6	72	" Hume	3.6	72
" Hanlan	3.6	72	Miss A. Lamb	3 5	70

O. C. A., July 31st, 1901.

TO THE PATRONS OF THE O. A. COLLEGE DAIRY.

We are much pleased with the *quantity* of milk sent in by you during the past month. The results show care on your part to maintain the flow of milk. A little more attention to the *quality* of the milk would enable us to make better butter and cheese and would prevent us from returning your milk. We do not like to return any milk to patrons. It hurts us more than it does them. A considerable portion of the milk has been over-ripe and bad-flavored at times during the past month. Be careful with the food given to the cows. Keep everything clean where the milk stands at night Cool the milk at night. If you will do your part, we shall try to do ours to make dairying profitable to you.

As the butter and cheese markets are dull, we shall not be able to pay more than the guaranteed season's price of *20 cents per pound of fat for September.*

Do not forget that we shall take all the milk you can supply us during the winter. We want 5,000 lbs. daily from December to March, for which we shall pay 25c. per lb. fat delivered.

Test and Value per 100 lbs. Milk.

Names of patrons.	% fat.	Cents.	Names of patrons.	% fat.	Cents.
Dairy Herd	3 7	77.7	Mr. Hanlan	3 7	77 7
Farm Herd	3.4	71 4	" Hamilton	3 5	73 5
Mr. Daniels	4.0	84 0	" Dickson	3.7	77 7
" Arkell	3 2	67.2	" Gordon	3 6	75.6
" Heskett	3.5	73.5	" Atkinson	3.6	75.6
" Tolton	3.5	73.5	" Phil ips	3.5	73.5
" Byrne	3.4	71 4	" Lamb	3 5	73.5
" Graham	3 5	73.5	" Starkey	6.0	126 0
" McDougall	4 5	94.5	" W. J. Laing	3 4	71 4
" Clair	4 0	84 0	" Peter Laing	3.7	77 7
" Moore	3 4	71 4	Miss R. Laing	3 8	79 8
" Lewis	3 4	71.4	Mr. Roberts	3.7	77 7
" Walsh	3.4	71 4	" Hume	3.6	75 6
" McNulty	3.8	79.8	Miss A. Lamb	3.7	77.7

O. C. A., August 31st, 1901.

TO THE PATRONS OF THE COLLEGE DAIRY.

The past month of September has been an excellent one for the cheap production of milk. We are pleased with the supply you have sent us, and hope that during the coming month of October, you will maintain the present supply.

This can be done only by careful feeding, stabling the cows on cold nights, and adding a fresh cow or two to the herd. Do not expect the cows which have been milking the whole summer to give as much milk now as they did earlier in the season. It is a wise plan to allow the cows to go dry for six weeks to two months before parturition. Cows which will calve in November and December should be dry this month.

A few mangels night and morning are excellent for keeping up the flow of milk in October and November. Please do not feed Swede turnips or turnip tops. Stand by the cow and your creamery and they will stand by you! Both the cow and the creamery are aiming to make it *pay* you to keep cows.

The following are the tests and values per 100 lbs. for September :

Names of patrons.	% fat.	Cents.	Names of patrons.	% fat.	Cents.
Dairy Herd	3 6	72	Mr. Hamilton	3.9	78
Farm Herd	3 3	66	" Dickson	4.0	80
Mr. Daniels	4 2	84	" Gordon	3.7	74
" Arkell	3.4	68	" Atkinson	3 7	74
" Hesketh	3.5	70	" Phillips	3.6	72
" Tolton	3 7	74	" Mulroney	3.9	78
" Graham	3.5	70	" Lamb	3.6	72
" Kitching	3 9	78	" Starkey	5.7	114
" Clair	4 0	80	" W J. Laing	3.4	68
" Moore	3.4	68	" Peter Laing	3.6	72
" Lewis	3.9	78	Miss R. Laing	3.9	78
" Walsh	3 6	72	Mr. Roberts	3.8	76
" McNulty	3.8	76	" Hume	3.6	72
" Hanlan	4.1	82	Miss A. Lamb	3.7	74

O. A. C., September 30th, 1901.

Export of Butter in Pound Prints. A small shipment of butter in pound prints was made to London, England. At the time of writing we have not received a report on the shipment. With cold storage facilities, there is no reason why mildly salted, pasteurized butter, put up in the form of pound blocks and wrapped in parchment paper, should not be successfully exported. We hope to make some further shipments next year.

Parchment Butter-Paper. Parchment paper now plays such an important part in the preparation of butter for local and export markets, that it would seem necessary to adopt some standard. Nearly every dealer has paper that varies in weight, color, and quality from that of other dealers. Some of the paper sold as "parchment" is useless for butter.

One firm sent us two different lots of paper which users had returned saying that it tainted the butter. Several prints were wrapped in this paper, and lots of the same butter were put up in our own paper. With the exception of one print, on which there seemed to be a slight taint, the paper proved satisfactory.

Cold Storage Late in the year 1900, a small cold-storage building on the Hanrahan system was erected for the use of the dairy and poultry departments. So far, it has been a great aid to us in our experimental work, and has given good satisfaction, except in two points : The butter put into the refrigerator in the early part of the season had a strong "piney" flavor, due to the lining of the room with pine lumber, instead of spruce. We would recommend spruce lumber for the inside lining of the refrigerator compartment. The second point in which the cold-storage did not reach our expectations was in the removal of flavors from the cooling room. Warm poultry, placed in the refrigerator, produced a very strong odor,—sufficient to taint the butter and cheese, if left there for any length of time. Another year it will be necessary to have some other

arrangement, as it is not wise to put dressed poultry in the same room with dairy products.

Improvements Made and Needed. In addition to the cold-storage, we placed cement floors in the cheese-room and in the boiler-room of the dairy buildings. These are excellent floors, such as should be found in every cheese factory and creamery of the Province. The cost was about 11¼ cents per square foot.

To improve the draft of air from the sub-earth duct to the curing rooms, a reverse cowl was placed on the ventilator of two of the rooms; and for the other, a connection was made with the chimney. Both plans worked well, especially the latter.

New rope drives have been put in place for the summer creamery and for the new dairy building.

We need more room for the instruction in hand separators given to the College classes in farm dairying. Our present room, which is largely taken up with experimental creamery apparatus, is altogether too small for efficient instruction. We must have more floor space another year. We also need an improved system of ventilation in our dairy stables, and improvement in our sewerage.

Feeding Calves Experiments were conducted from July 4th to September 26th with six calves, in which new milk was compared with skim-milk, bran, and oats, and with skim-milk, oil-cake, bran, and oats. The calves were Holsteins, Holstein grades, and one Ayrshire grade. Their ages ranged from about two weeks to five months when we began the experiment.

Calves Nos. 1 and 2 (4 and 5 months old) gained 100 pounds in three weeks on skim-milk, bran, and oats, at a total cost of 1 87 cents per pound of gain. On skim-milk, bran, and oats, and oil-cake, they gained 91 pounds in three weeks, at a cost of $2.68, or 2.94 cents per pound of gain.

Calves Nos. 3 and 4 (6 months and 2½ months old) gained 73 pounds in three weeks on skim-milk, bran, and oats, at a total cost of $2.04, or 2.79 cents per pound of gain. On skim-milk, bran, and oats, and oil-cake, they gained 81 pounds in three weeks, at a total cost of $2 68, or 3 31 cents per pound of gain.

Calf No. 5, which was two weeks old when the test was begun, was fed 14 pounds new milk daily for the first three weeks, and gained 35 pounds at a total cost of $2.35, or 6.71 cents per pound of gain (milk was charged at 80c. per 100 pounds). When fed skim milk, bran, and oats, and oil-cake, it gained 45 pounds in three weeks, at a cost of $1.00 for feed, or 2.22 cents per pound of gain.

Calf No. 6 (6 weeks old) fed on skim-milk, bran, and oats, and oil-cake, gained 43 pounds in three weeks at a total cost of $1.00, or 2.32 cents per pound gain.

Summary. The four older calves gained 172 pounds in three weeks at an average cost of 3.12 cents per pound of gain, when fed on skim milk, bran and oats, and oil-cake. On the skim-milk, bran, and oats they gained 173 pounds at a cost of 2 33 cents per pound gain in live weight.

The two younger calves gained 88 pounds in live weight in three weeks on skim-milk, bran, and oats, and oil cake, at an average cost of 2.27 cents per pound of gain.

The whole milk at 80 cents per 100 pounds was the most expensive food, yet it is necessary for the first three or four weeks of a calf's life, in order to rear thrifty calves.

Dairy Herd The Dairy herd on December 15th consisted of the following: Twenty-eight cows, comprising ten pure-bred Holsteins, four Jerseys, one Ayrshire, and thirteen grade cows; eleven heifers, three Holstein, one Jersey, one Ayrshire, and six grades; nine calves, five Holstein, one Ayrshire, and three grades; making a total of forty-eight head in the Dairy Department.

The dairy herd for the eleven months, from January 1st to November 30th, supplied milk to the Dairy School and for experimental purposes to the value of $1,475 68.

In addition, milk to the value of $48 86 was sold by the quart, making a total of $1,524.54 for sales of milk from the herd in eleven months. Considerable milk was also used in the stable for rearing calves, and for experiments in calf-feeding.

A Holstein cow from the dairy herd made one of the five in the Model Dairy herd at the Pan-American Exposition during the summer, consequently her milk was lost to us for the season.

Record of the Dairy Herd from Dec. 1, 1900, to Nov. 30, 1901 :

Name of Cow.	Date when last ca was dropped.	Breed.	Live weight.	No. of days milking.	Total lbs. milk.	Per ct. fat in milk.			Total lbs. fat in milk.	Total lbs. butter estimated by adding 15% to fat.
						Average for year.	Highest test monthly.	Lowest test monthly.		
			lbs.							
Mercena	Nov. 25, '00	Holstein	1,290	345	11,379	3 34	3.60	3.10	380 06	437.07
Meg	Mch. 17, '01	"	1,440	268	10,737	3.28	4.20	2.80	352.17	404.99
Daisy of R	Dec. 20, 00	"	1,180	323	9,998	3.30	3.40	3.00	329.93	379 41
Topsy	Apr. 3, '01	Grade	1,100	323	9 898	3.63	4.50	3.10	359 29	413.17
Margaret	Dec. 16, '00	Holstein	1,405	343	9,033	3 27	3.50	3.00	295 37	339 67
Twenty	Dec. 1, '00	Grade	1,100	285	8,964	3.70	4.00	3.50	331.66	381.41
Molly	Jan. 23, '01	Grade Hol'n	1.425	287	8,917	3 64	4.00	3.40	324.57	373.25
Grey	July. 27, '01	" Shorth'n	1,125	282	8,509	3.80	4.40	3.40	323.34	371.84
Eula	Mch. 19, '01	Holstein	1,110	359	8,053	3.22	3.70	3.00	259 30	298.19
Lady S	Feb. 6, '01	"	1,270	336	8,004	3.63	4 60	3.20	290 54	334.12
Dolly	Nov. 23, '01	Grade Hol'n	1,440	309	7,737	3.68	4.10	3.40	284 72	327.41
Meg Netherland	Feb. 6, '01	Holstein	1,295	259	7,676	3.53	4 20	3.10	270.96	311.60
Carrie	Mch. 4, '01	"	1,180	267	7,401	3 16	3.40	2.80	233 87	268.95
Eva	Apr. 15, '01	Ayrshire	1,360	275	6,805	3.34	3.70	3.10	227.28	261.37
Margaret C	Aug. 1, '01	Holstein	1,264	280	6,665	3 41	4.20	2.80	227.27	261.36
Polly	June, 19, '01	Grade Hol'n	1,280	267	6,368	3.62	4.20	3 30	230.52	265.10
Bella	July 2, '01	" Ayrshire	1,220	295	6,343	3 50	3.80	3.20	222.00	255.30
Lucy	May 24, 01	" Holstein	1,165	280	5,963	3.77	4.40	3.40	225.03	258.78
Moss	May 28, '01	Grade	1,070	274	4,727	4.60	5.70	3.80	217.44	250.05
Average			1,247	297	8.114	3.54			283.44	326.00

Comments on Herd Record. 1. The table gives the record of all milking cows which have been in the Dairy Herd from Dec. 1, 1900, to Nov. 30th, 1901.

2. The largest milker for the year produced 11,379 lbs milk, containing an average of 3.34 per cent. fat, which is equal to an estimated production of 437 lbs. butter. This cow is a pure-bred Holstein. The second and third largest milkers are also pure-bred Holsteins. The second largest butter producer is a grade with probably some Short Horn blood in her.

3. The average live weight of each milking cow is 1,247 lbs.

4. The average number of days which each cow milked was 297.

5. The quantity of milk given by each cow averaged 8,114 lbs.

6. The percentage of fat in each cow's milk averaged 3 54.

7. The total average pounds of fat in the milk of each cow was 283 4, which is equal to an estimated production of 326 lbs. butter per cow.

8. We expect to make our herd average 10,000 lbs. milk, or 400 lbs. butter, per cow.

We are indebted to the Farm Department for pasture, corn silage, hay, and roots, and for sundry services in teaming. From the Dairy, the Farm has received the manure from 30 cows, and most of the surplus skim-milk, buttermilk, and whey for the season. Skim-milk has also been supplied to the Poultry Department.

All of which is respectfully submitted,

H. H. DEAN,
Prof. of Dairy Husbandry.

PART VIII.

REPORT OF THE PROFESSOR OF AGRICULTURE.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith my ninth annual report.

The most important change in my department this year, is the appointment of Mr. M. Cumming to the position of Assistant in Agriculture. This has proved a wise step, as Mr. Cumming is an enthusiastic worker and is thoroughly competent to perform the duties of assistant; and we are now in a much better position to do justice to this important branch of college work.

The course of instruction in agriculture is fully outlined in the college circular, and therefore needs no extended notice here. The live stock experiments, and matters relating to the management of the farm, are of more general interest, and a detailed report is given below.

STEER FEEDING.

CORN SILAGE VS. ROOTS.

Frequently questions have been received regarding the relative values of silage and roots for fattening animals, and while some experimental work has been done along this line, the results are by no means conclusive. This experiment, therefore, is the first of a series of experiments which we propose to conduct.

Twelve steers were divided into two groups of six steers each. One group was fed silage, hay and meal; and the other roots, hay and meal. Three pounds of hay were fed for every four pounds of roots; and three pounds of hay were fed for every four pounds of silage. The meal rations were the same for each group. The roots consisted of both turnips and mangels, turnips being fed during the first part of the experiment, and mangels near the close.

In explanation of the statement given below, it may be necessary to say that the term "dry matter" refers to what is left of any fodder after the moisture has been driven off by heating at a high temperature. Silage contains, approximately, about 20 per cent. of dry matter, and roots 10 per cent. It is true that these succulent foods vary considerably with regard to the per cent. of dry matter which they contain, but the percentages given above are fair averages. The dry matter in the hay and meal has been estimated from the latest analyses available.

Gain in Weight and Dry Matter Consumed

	Silage group.	Root group.
	lbs	lbs.
Weight of 6 steers Nov. 30th	6 663	6,874
Weight of 6 steers April 26th	8,127	8,281
Total gain	1,464	1,407
Dry matter consumed for 100 lbs. average live weight	250	259
Dry matter consumed for one pound increase in weight	12.62	13.95

NOTEWORTHY POINTS 1. The steers receiving silage made slightly larger gains than those receiving roots.

2. The steers fed silage consumed less dry matter in proportion to their live weight than those fed roots.

3. It required less dry matter to produce a pound of increase in weight in the case of the silage fed steers than in the case of the root fed steers.

4. In this experiment, therefore, corn silage scored a decided advantage over roots.

5. It must not be forgotten, however, that this is only a single experiment, and the results must not be regarded as conclusive.

Relative Cost of Dry Matter in Silage and Roots. Since the dry matter of silage made such a favorable showing in the feeding test, it is of interest to study the cost of producing a ton of dry matter in the two crops. It is impossible to obtain comparisons that are true for all cases, since the cost of cultivation is influenced by the season, the nature of the soil, the presence or absence of weeds, the quality of the labor employed, and other varying conditions. At the same time, it is possible to make comparisons that are instructive, though they may not be entirely accurate.

In the farm department this year we had 8 acres of intermediate mangels lying beside 34½ acres of fodder corn. The land had all been plowed out of sod the previous fall and manured during the winter, the manuring being as nearly the same for both crops as we could make it. All labor expended upon drawing manure, spring preparation, sowing, hoeing, cultivating and harvesting was carefully recorded. The fall preparation, being the same for both, and consisting of plowing, twice harrowing, and once cultivating with spring tooth cultivator, has been valued at $2.50 per acre for both crops. Other labor was valued at the rate of $2 50 per day for man and team and $1 25 per day for each man. Considerable of the work was performed by unskilled laborers, much of it being done by students who had little or no previous experience; so while $1 25 per day may appear a low valuation for day labor, it is really a very high average valuation under the circumstances.

It will be understood, then, that the statement of the cost of production, given below, is based solely upon the labor bestowed upon the two crops. The yield of silage was reckoned by the amount of silage in our silos, and the yield of mangels from the number of loads in waggon boxes of known capacity. A statement of the calculations is given below.

Comparison of corn silage and mangels grown in Farm department.

	Corn silage.	Mangels.
	tons.	tons.
Total yield per acre	15	21
	$ c.	$ c.
Cost of labor per acre	9 23	19 80
Cost of labor for one ton	62	94
Cost of labor for one ton of dry matter	3 10	9 40

Since more turnips than mangels were used in feeding the steers, it would seem reasonable to use them for this comparison. The turnips were grown under such different conditions, however, that comparison was impossible, and, after all, the labor involved in growing mangels is probably less than that required for turnips. The per cent. of dry matter allowed for the mangles (10 per cent) is also a very fair allowance for turnips.

The yields of the two crops may be called fair averages for this part of the Province.

Summary. The cost of producing a ton of silage was considerably less than that of a ton of mangels; and since silage contains, according to our estimates, twice as much dry matter as roots, the cost of producing a ton of dry matter was very much lower in the case of the corn crop.

2. When it is taken into consideration that the dry matter of silage proved, at least, equal to the dry matter of roots for fattening steers, the comparison becomes almost startling.

3. Making every allowance for errors, for variations in conditions, and for the uncertainties of a single feeding experiment, we must still admit that silage compared with roots, is a cheap and useful food for fattening steers.

4. While roots may be more expensive than silage, we would be sorry to miss them from the bill of fare provided for our stock. They are very beneficial to the health of breeding stock, and are especially valuable for young animals.

Peas vs. Corn for Fattening Steers.

This is a continuation of last year's work, except that last year the peas and corn were mixed with oats, whereas this year they were not. Last year the mixture of peas and oats gave larger gains than the mixture of corn and oats, but the difference in gains was not sufficient to compensate for the extra cost of the pea mixture.

This year, twelve steers were divided into three groups of four steers each. One group was fed pea meal, another was fed corn meal, and the third was fed a mixture of equal parts by weight of corn and peas. The rest of the ration, consisting of hay, silage, and roots, was the same for all groups. Below is given a statement of the weights, gains, and meal consumed per pound of gain live weight.

——	Pea Group.	Corn Group.	Corn and Pea Group.
	lbs.	lbs.	lbs.
Weight of four steers, November 30th	4,490	4,556	4,491
" " June 3rd	5,650	5,810	5,710
Total gain of four steers	1,160	1,254	1,219
Meal consumed for one pound increase in weight	4.139	3.823	3.901

Summary. 1. In this experiment, corn maintains its reputation as a fat producer. When the main object is the production of fat, probably no single kind of grain excels corn.

2. Peas may generally be depended upon to do better in combination with other grains than when fed singly. The close, heavy nature of pea meal renders it difficult to digest, and consequently it should be mixed with something of a lighter nature, such as oats or bran.

3. Mixing corn meal with pea meal apparently improved the fattening value of the latter, although corn meal, in a somewhat less degree, possesses the objectionable heavy nature of pea meal, and cannot be regarded as an ideal substance to mix with it.

EXPERIMENTS WITH SWINE.

Influence of Roots.

In these experiments, an effort was made to determine the influence of roots upon the rate of gain in fattening hogs, and their influence, if any, upon the firmness of the bacon produced. There were really two experiments running concurrently, and they can be described more quickly by taking them together.

Experiment A. Eight high grade Yorkshire pigs about seven weeks old, and of one litter, were divided into two equal groups, which we shall call groups I and II.

Experiment B Ten high grade Yorkshire pigs about nine weeks old, and of one litter, were divided into two equal groups which we call groups III and IV.

The rations for the different groups were as follows :

Group I. Barley and middlings.

Group II. Barley and middlings mixed with an equal weight of pulped mangels (fed raw).

Group III. Corn and middlings.

Group IV Corn and middlings mixed with an equal weight of pulped mangels (fed raw).

The proportion of grain and middlings was the same for all groups, viz. :

October 23 to December 11, 1 part grain to 2 parts middlings.

December 12 to January 23, 1 part grain to 1 part middlings.

January 24 to May 7, 2 parts grain to 1 part middlings.

The principal points brought out in the first part of the experiment can be shown most clearly by means of a table.

Table showing gains and dry matter consumed per 100 lbs. of gain.

Groups.	Total weight Oct. 23.	Total weight May 7.	Average daily gain per hog.	Dry matter consumed per 100 lbs. gain.
	lbs.	lbs.	lbs.	lbs.
Experiment A.				
Group I. 4 hogs; barley and middlings...	169	670	.639	439.22
Group II. 4 hogs; barley, middlings and roots	168	840	.857	380.15
Experiment B.				
Group III. 5 hogs; corn and middlings....	276	940	.677	424.55
Group IV. 5 hogs; corn middlings and roots.....	276	1,020	.757	403.74

Noteworthy Points It will be noticed that there is a great difference between groups I and II, both in regard to rate of gain and dry matter required for 100 lbs. increase. Indeed, the difference is so great that one can scarcely believe that it is entirely due to the difference in feeding. The individuality of the animals has undoubtedly had an influence, though they all belonged to one litter, and were divided as carefully as possible at the beginning of the experiment.

It is a significant fact, however, that in each experiment the group receiving roots made larger gains, and required less dry matter for 100 pounds gain than the group which received no roots.

In *Experiment A* about 319 pounds of roots were equivalent to 100 pounds of meal. This may, with safety, be regarded as an abnormally high value for roots, and shows that individuality, or some unknown influence, played an important part in bringing about such a result.

In *Experiment B* 564 pounds of roots proved equal to 100 pounds of meal. This is also a very high value for roots, and is much higher than one would expect from the composition of the foods used in the experiment. According to analyses and digestion experiments, there is, approximately, about nine times as much digestible dry matter in a mixture of corn and middlings as there is in mangels. It is difficult to explain, therefore, why 564 pounds of mangels should prove equivalent to 100 pounds of meal.

There was a marked difference, however, between the hogs which received roots and those which did not in each experiment. Those which were fed roots were much more growthy and thrifty looking than the others, and showed less tendency to become fat. In fact, it was found necessary to reduce the proportion of roots towards the close of the experiments in order to get these hogs fat enough. It is possible, therefore, that the roots had a beneficial effect upon the digestive organs of the animals, causing them to digest their food better than did the others, for there is little doubt that hogs closely confined in pens are likely to suffer from indigestion.

The results indicate the need of further experiments.

Quality of Bacon Produced In order to test what effect the roots would have upon the firmness of the bacon from the hogs in the experiments just described, the four groups were shipped to the Wm. Davies Co, Toronto, and the bacon carefully examined after it came out of the salt. Below is given the report:

"The shipment of hogs which you recently sent to us came out of salt to day, and we have pleasure in handing you a report on the same. This shipment is by far the most satisfactory which we have yet inspected, whether on account of the feed or other conditions which you have observed, we have not yet learned. It was very noticeable that the sides which turned out soft invariably belonged to hogs which were manifestly unfinished. Without exception the backs of the soft sides were thin (usually less than $\frac{3}{4}$ inch in thickness) and in general pointed not so much to lack of weight, but rather to the hogs having been marketed before they were in a marketable condition. This is true also in a wider way according to our experience. The bulk of soft sides in our house come from No. 3 and No. 4 selection, which classes comprise the light weights. In looking over these the thinness of the backs strikes one at the outset, the great majority of the

soft sides coming from hogs which have been marketed before they had sufficient fat on them, although in some cases No. 1 sides which would otherwise grade as first-class sides showed a tendency to softness. It is, however, true, even in Western hogs, that there is a tendency in the heavier weight sides to be firm, and in the light weight sides to show a disproportionate softness.

The following is the report of the four groups of hogs :—

Group No. 1 : 8 sides, two of which were soft. The others grade as No. 1 sides, although there was noticeable in all a very slight tendency to pastiness.

Group No. 2 : 8 sides ; 2 sides soft ; 2 sides grading No. 2 (fat). The other 4 sides were very firm.

Group No. 3 : 10 sides ; 4 sides tender, *i.e.* showing softness, but not so soft as to be excluded from No. 1 sides ; 2 No. 2. The rest grade as No. 1 sides, although the class as a whole inclines to slight pastiness.

Group No 4: 10 sides ; 4 sides soft ; 2 grade as No. 2 sides. The balance were very firm.

In the above groups 2 and 4 were superior in quality to 1 and 3, in that the No. 1 sides in the first were distinctly harder than the corresponding sides in the other two groups."

The last paragraph of the report is of especial interest, since groups 2 and 4, which are pronounced decidedly superior, are the two groups which received roots.

The two main points brought out by these experiments are :—

1. The feeding of equal weights of roots and meal gave more rapid and more economical gains than the feeding of meal alone

2 The hogs fed roots produced bacon of superior quality to those which were not fed roots.

In connection with the above it must be remembered that the quantity of roots used was a very moderate one, and the excessive use of roots might have an opposite effect.

Experiments with Pure Bred Swine

For five years preceding the present year, we had comparisons of Yorkshire, Tamworth, Berkshire, Chester White, Poland China, and Duroc Jersey swine ; and the results of these experiments have been published in the College reports. It was suggested, however, by the Dominion Live Stock Commissioner, Mr. F. W. Hodson, that an experiment embracing the same breeds as those used heretofore, but conducted on a much larger scale than the previous ones, and including a test of the value of pasture for hogs, should be conducted at several points within the Province, one of which points should be the college. The cost of the experiment was to be defrayed by the Dominion Department of Agriculture, and the hogs selected by competent men appointed by the Live Stock Commissioner or the Secretary of the Provincial Live Stock Associations. Upon these conditions, it was agreed to take one of the experimental lots, and the objects of the experiments may be summarized as follows :

1. To compare, on a larger scale than heretofore, the suitability of six leading breeds of swine for the export bacon trade.
2. To test the economy of feeding hogs on pasture, as compared with feeding in pens.
3. To test the influence upon the firmness of bacon, of feeding rape with meal.

The original intention was to have at least ten hogs of each breed at each feeding station, and contracts were made with breeders several months before the experiment commenced for the required number of animals. When the time for delivery came, however, it was found extremely difficult to get enough hogs, and impossible to get them all up to the standard required in the specifications. There was a wide variation in the size of the animals, and many of them were so small that it was useless to attempt feeding them on pasture with the larger hogs. The Yorkshires and Berkshires were fairly uniform, and consequently it was decided to use only these two breeds for comparing the economy of gain under the two systems of feeding. Of the remaining hogs, the larger and stronger ones were selected for putting on pasture, and the smaller and less thrifty ones were kept in the pens.

Feeding: Early in the spring, 1½ acres of ordinary tares, or vetches, were sown; and about the middle of May, 1½ acres of rape were sown adjoining the tares. On July 6th, 43 hogs were turned upon one acre of the tares, the remaining half acre being retained for cutting and feeding to the inside hogs. The hogs arrived too late for the best results from the tares, as the crop had grown so high that much of it was wasted by being trampled down. On August 6th, they were given half an acre of rape, and on September 10th, another half acre, the remaining half acre being reserved for the inside hogs.

Both outside and inside hogs were fed twice a day what meal they would eat readily. The meal was fed dry, and consisted of two parts barley to one part middlings by weight during the greater part of the experiment. The inside hogs were fed all they would eat of green feed, receiving tares until August 6th, and rape after that date.

Water was provided for the outside hogs by means of Dewey hog watering fountains, which were attached to barrels, and thus a constant supply was available to the animals. Small portable pens afforded shelter.

Duration of Experiment: As already intimated, the experiment commenced July 6th On Oct 14th, the heaviest hogs, together with a number that we were sure would never make export hogs, were sent to the Wm. Davies Co., Toronto, to be slaughtered. The shipment also included a draft from a lot fed by Mr. G B. Hood, Guelph, who conducted a similar experiment. As the rape was eaten down somewhat closely, the remainder of the hogs were brought into the pens on Oct. 14th, and fed inside until Nov. 12th, when all were shipped to the slaughter-house, together with the remainder of Mr. Hood's lot.

Food Consumed per 100 lbs Gain: As explained before, only the Yorkshires and Berkshires were used to compare economy of gains from outside and inside feeding. All the inside Yorkshires and Berkshires were ready to ship on Oct. 14th, but seven Berkshires and three Yorkshires from the outside lot had to be carried over to Nov. 12th. The additional food consumed by these animals has been charged against the outside group in the following calculations: The meal consumed per 100 lbs. gain was as follows: Outside group, 525 lbs; inside group, 395 lbs. The outside group contained sixteen hogs, and the inside, eighteen hogs.

There is such a marked difference between these two groups, that it is of interest to note how all the outside hogs compared with all the inside hogs up to Oct. 14th, the date the first shipment was made. This is by no means a fair comparison, since, with the exception of the Yorkshires and Berkshires, the best hogs were selected in the beginning for outside feeding. In making the calculation, however, several decidedly unthrifty hogs were omitted from each lot. The meal required for 100 lbs. gain was: Outside hogs, all breeds, 510 lbs.; inside hogs, all breeds, 414 lbs.

From this it will be seen that, in spite of their serious handicap, the inside hogs, as a whole, made more economical gains than the outside ones.

Suitability for Export. After they were slaughtered, the hogs were critically examined and classified by an expert at the factory Only those heavy enough for export have been taken into consideration in the classification. The Tamworths were a very unsatisfactory lot. Several of them died, and a number of others fell hopelessly behind the rest, and finally had to be dropped out of the experiment. Originally there were 14 Tamworths, but only 4 of these were heavy enough when the experiment closed. Some of the Duroc Jerseys were good hogs, but a number of them developed into little, short, chubby animals that could never make exporters, and so were allowed to go as "scalders" with the first draft. The same fault was also more or less marked in the Poland Chinas and Chester Whites; in fact, out of ten of the latter there were only two really satisfactory animals. The Yorkshires and Berkshires were greatly superior to the rest from a feeder's point of view.

In the classification given below, "No. 1 Selection" signifies hogs suitable for best Wiltshire sides "No. 2 Selection" refers to those of about right weight (though usually rather heavy), but too fat for best Wiltshires. "Selected Fleshy" is between No. 1 and No. 2 selections, not so objectionable as No 2, but rather thick for No. 1. "Unfinished" denotes animals that are not fat enough, though the weights may be suitable.

Factory classification.

Breed.	No. of Hogs suitable for export.	No. 1 Selection.	Selected Fleshy.	No. 2 Selection.	Unfinished.
Yorkshire	17	14	3		
Berkshire	21	15	2	3	1
Durock Jersey	12	6	2	3	1
Poland China	9	3	1	3	2
Tamworth	4	4			
Chester White	3	2			1

The Yorkshires were, by all odds, the best lot of hogs, being much more uniform than any of the others. Some of the Berkshires gave excellent sides, but a number of them were decidedly faulty, even of those grading No. 1. There was a lack of uniformity in this group, and they varied from good length to extreme shortness. One strong point in favor of these two breeds is the fact that there were practically no culls among them. The other breeds were very unsatisfactory, the Tamworths being a particularly poor lot from the start. The four that reached the desired weight were good hogs, but since only four out of fourteen reached this weight, it is certainly a very poor showing.

Firmness of Bacon. All the sides of bacon were marked in such a manner that we could distinguish the sides of the inside hogs from those of the outside group when they came out of the salt. Below is given the packing-house report :—

"The last shipment of hogs which you sent to us is just out of salt, and we have to report to you that all the sides without exception show a very satisfactory degree of firmness. Our bacon inspector's report is that all the sides grade No. 1 in respect of hardness, and my own judgment of the sides, going over them trying to find differences that might be of some value to you, was that there was practically no difference between the different sides, either in the groups themselves, which you designated by A and B, or in contrasting the two groups. Whatever your method of feeding has been in regard to these particular hogs you certainly have discovered some system that gives very excellent results."

Summary. 1. In this experiment, feeding hogs on pasture proved a very expensive method, whereas feeding in pens with the same kinds of food gave reasonably economical gains.

2. The outside hogs ate more meal and made slower gains than those fed inside.

3. The Yorkshires proved the most satisfactory lot from the packer's standpoint. The method of conducting the experiment did not permit of comparing the relative cost of gains made by different breeds.

4. All the hogs produced bacon of satisfactory firmness. This result confirms the result of a previous experiment with rape, and goes to show that a reasonable supply of green feed with a liberal meal ration produces a good quality of bacon.

5. Succulent food tends to keep animals thrifty, whether it be green food or roots, and thriftiness is conducive to firmness in the bacon produced.

6 The inside hogs consumed, on an average, nearly 4 lbs. of green food each per day, together with $4\frac{1}{3}$ lbs. of meal.

7. As this proportion of green feed to meal is practically the same as the proportion of roots to meal which we have used with good results, it seems safe to assume that the use of equal weights of succulent food and meal tends to produce bacon of firm quality.

8. The time required to attend to the outside hogs was just about half of that required for those inside.

FARM SUPERINTENDENCE.

Improvements.

During the summer, a system of ventilation was put into the Farm cattle stables under the main barn. For a full description of this system, see report of Professor of Physics. Apparently it is doing good work, and if it proves equally satisfactory throughout the winter, it is intended to adopt a similar method for the horse and bull stables.

Some 80 rods of new wire fence have been erected during the year, and some minor alterations in the bulldings have also been made.

Crops.

Meadow. Of hay crop, we had about 100 acres. The hay was an exceptionally good crop, the abundant moisture of May and June being very favorable for it. The average yield was about 2⅔ tons per acre.

Oats. About 52 acres of the Siberian variety were sown. Commenced sowing April 15th, and harvesting, July 26th. Quantity of seed, 1½ bus. per acre. The hot, dry weather of July ripened the crop too early, and the yield will be considerably below that of last year, though very few have been threshed at time of writing.

Cultivation for Oats. Oats followed corn and mangels. The corn roots were loosened with a plow without a mould-board, in the fall. Then the ground was harrowed, cultivated with the spring-tooth cultivator, and subsequently ribbed up with a double mould-board plow. The mangel ground was cultivated and ribbed in the fall. In the spring, the ground was harrowed, cultivated, harrowed, sown with a drill, gone over with a weeder to smooth the surface, and finally rolled after seeding was all finished.

Barley. About 16 acres of Mandscheuri barley were sown at the rate of a little over 1½ bus. of seed per acre. It was sown April 27th, and harvesting commenced July 23rd. As with all our grain crops this year, it ripened too quickly, and the yield will be below the average of last year.

Cultivation for Barley. Barley followed potatoes and turnips, and cultivation was the same as for oats after mangels.

Mixed Grain : This consisted of oats and goose wheat mixed in proportion of 2 bus oats to 3 bus. wheat. About two bushels of seed per acre were used. The yield will be fair, considering the season, though a mixture of two-rowed barley and oats is probably a better one to use.

Cultivation for Mixed Grain. This crop was sown on about 20 acres of ground that had been in rape and millet the preceding year. The millet ground was fall plowed, but the rape ground was not plowed until spring, when it was gone over lightly with a two-furrow plow. The spring cultivation was practically the same as that for oats.

Winter Wheat. We had 22 acres of this crop, following peas. Dawson's Golden Chaff and Early Genessee Giant were the varieties used. It came through the winter fairly well, but rusted considerably, and was also injured to some extent by the Hessian fly. Yield, 20 bus. per acre.

Cultivation for Wheat. The pea stubble was gang plowed lightly immediately after harvest, harrowed, rolled, and allowed to lie a week or ten days to accumulate moisture. The seed bed was prepared by means of the spring tooth cultivator and harrow, and the wheat sown with the drill on Sept. 10th to 12th at the rate of a little less than 1½ bus. per acre. Timothy seed was sown with the wheat at the rate of between 3 and 4 lbs. per acre, and 8 lbs. of clover seed per acre was sown before the frost was out of the ground in the spring.

Peas. This crop comprised 22 acres, 10 acres of which were grass peas. The peas were a poor crop. They started well, but seemed to blight when in blossom, and were next thing to a failure. The grass peas were not a good crop either, and ripened very unevenly. A part of the field was lower than the rest, and the peas on this part were quite green when other parts of the field were ripe. This made the harvesting very unsatisfactory, and is certainly a serious objection to the crop. The yield will probably not be more than between 10 bus. and 15 bus. per acre.

Cultivation for Peas Sod land was plowed in the early fall about four inches deep, rolled, and harrowed twice. Later it was cultivated with the spring tooth cultivator, most of it being gone over twice, and some of the more weedy portion three times. Manure was applied during the latter part of the winter and early spring. The land was gang plowed in the spring, harrowed, and the seed sown with the drill at the rate of 1½ bus. per acre in the case of the grass peas, and 3 bus. per acre for the others. Date of seeding, May 9th.

Mangels and Sugar Beets. Eight acres of Bruce's Giant Yellow Intermediate mangels, and 4 acres of Danish Improved sugar beets were sown. They were sown May 13th to 15th in drills 30 inches apart, at the rate of 4 lbs. of seed per acre. Harvesting commenced Oct. 3rd, and the average yield was 700 bus. per acre.

Cultivation for Mangels and Sugar Beets Fall cultivation practically the same as for peas. Manure was applied during the winter at the rate of about 15 tons per acre. In the spring the land was gang plowed, harrowed, rolled, gone over once, and then crossed with the grubber to loosen the lower soil, harrowed, rolled, and ribbed up with the double-mould-board plow ready for sowing. The plants were left from 12 to 15 inches apart in the rows.

Corn. Our corn this year comprised 34 acres of the Leaming variety. Planting commenced May 23rd. The cold, wet weather following planting necessitated planting a considerable part of the field a second time. It made rapid growth during the hot weather, and yielded about 15 tons of well-eared silage per acre. Cutting, which was performed by hand, commenced Sept. 14th.

Cultivation for Corn. Fall cultivation and manuring was the same as for mangels. In the spring, the land was gang plowed, harrowed thoroughly, and rolled. The corn was planted by hand in hills 38½ inches apart. The heavy rains necessitated subsequent harrowing before the corn was up, to break the crust and admit air. When the corn was a few inches high, it was cultivated both ways with a two-horse cultivator, and was afterwards gone over with the scuffler. The crop was hand-hoed twice, and some weedy patches, three or four times.

Potatoes. Seven acres of Empire State potatoes were planted in the young orchard. Planting commenced May 15th, and digging, October 17th. This was one of the best crops on the farm, the yield being over 300 bus. per acre. The seed potatoes were kept in a dark cool cellar until the weather became mild. About the middle of April, before any sprouts appeared, they were carried into the barn and spread out thinly upon the floor. Consequently, when they were planted, the potatoes were firm and sound, and any sprouts which had started were short and strong, and did not easily break off The potatoes were cut into medium-sized pieces, leaving at least two good buds on each piece. They were dusted with land plaster immediately after cutting, and planted as soon as practicable afterwards.

Cultivation for Potatoes The potatoes followed sod, which was treated as described for peas Manure was applied in the fall at the rate of 15 tons per acre, and the land ribbed with a double mould-board plow. In the spring, these ribs were harrowed down, and the land plowed about five inches deep. The grubber could not be used on account of the tree roots After harrowing and rolling, the ground was ribbed up with the double mould-board plow, and the potatoes planted one foot apart between the ribs, which were 28 inches apart. The ribs were split as soon as possible after planting, so as not to leave the potatoes long exposed to the sun. When the soil had become somewhat firm, it was harrowed lengthwise of the ribs, and later, cross harrowed. It was again harrowed when the plants were beginning to show. Subsequent cultivation comprised scuffling and hoeing to keep down weeds and prevent baking of the soil. Four sprayings with Paris green were found necessary.

Turnips. Less than 3 acres of Hartley's Bronze Top were grown in the orchard adjoining the potatoes. They were sown June 18th on drills 28 inches apart, and the plants were left from 10 to 12 inches apart in the rows. The yield was nearly 900 bus. per acre.

Cultivation for turnips Cultivation was very similar to that given the potato ground, with a few minor modifications to suit circumstances.

Rape About 8 acres were sown on new and swampy ground. Part was sown with the grain drill on the flat in rows 21 inches apart and part had to be sown broadcast. It was sown June 29th, and pastured by steers in September and October.

Live Stock.

The most important addition to our herd during the year is a yearling Shorthorn bull bred by Wm. Duthie, Collynie, Scotland, and imported in dam by Messrs. H. Cargill and Son, Cargill, Ont He is a good individual, and his breeding is first-class. There has also been purchased for us, in England, a Hereford bull calf, at the dispersion sale of the Court House herd of John Price. This calf will probably not reach the College before February.

We are retaining practically all over our pure-bred heifer calves, and while this policy lowers the revenue for the present, it will give us a chance to make a more satisfactory selection at a later date.

Bulls. In Shorthorns, we have one aged bull and two yealings. Of other breeds, we have one Aberdeen-Angus, one Hereford, one Holstein, one Ayrshire and one Jersey.

Feeding Bulls. The bulls receive a mixture of about equal parts by weight of cut hay and chaff, with 18 to 20 lbs of roots each in addition. The meal ration varies with circumstances, the aim being to feed enough to keep them in good breeding condition. Oats and bran constitute our favorite meal ration, though we sometimes feed the younger animals a little oil cake with it.

Beef Breeds of Cows and Calves. These comprise the following; Shorthorns, 3 cows, 4 yearling heifers and 3 heifer calves. Herefords, 2 cows, 1 yearling heifer, and two heifer calves. Aberdeen-Angus, 2 cows, 1 yearling heifer, and 2 heifer calves, Galloway, 2 cows, 1 bull calf, and 1 heifer calf.

Feeding Beef Breeds of Cows. The bulky part of the ration consists at the present time, of cut hay, pulped roots, and silage in the proportion of 3, 4, and 6 parts by weight respectively. These proportions are subject to change to suit circumstances. None of the dry breeding cows receive meal. Those suckling calves are fed a light meal ration from 3 to 5 lbs., depending upon conditions. Yearlings get little or no meal, as a rule. Calves are fed what they will clean up readily of oats and bran, with sometimes a small proportion of oil cake. The meal ration of all breeding stock is usually about one-third bran, the remainder being made up with almost any grain, or mixture of grains that is available; oats, barley, and wheat being the most commonly used, with the addition of pea meal at times.

Milch Cows. In this class we have 4 Holsteins, 1 Ayrshire, and 8 grades. We are keeping the heifer calves from the best cows, and hope, in the course of time, to build up a more uniform herd than we have at present.

Feeding Milch Cows. The milch cows are fed the same foods as the beef breeds, but are given about 20 lbs. of roots at noon, and are fed 7 to 8 lbs. of meal each per day when in full flow.

Steers. Fifteen steers are being fed in the farm stables at present. Three of these are fat steers which were purchased for the use of students, and for the short course in January. The remainder were bought in September, pastured on rape until Nov. 1st., and then taken into the stables.

Feeding Steers. The steers are fed the same bulky food as the other cattle. Their meal ration consists of about one part bran to four parts ground grain, which is a mixture of oats, barley, and wheat. It is intended to drop the oats very soon, and replace them with something cheaper, probably rye, if present prices continue. Through November they were fed only about 3 lbs of meal each per day. This has been increased to 4 lbs., and will be gradually increased until it reaches 8 or 9 lbs. by April 1st.

Sheep. Small flocks of Shropshires, Oxfords, Leicesters, and Cotswolds are maintained. We are in need of better quarters for our sheep. The pens should be on higher ground, and larger yards for exercise should be provided. Until this is done, it is useless to attempt carrying a larger stock.

Feeding Sheep. As grain is dear and somewhat scarce, we purpose feeding none to our sheep, except the lambs, which will receive about half a pound of grain each per day. About four pounds of turnips each per day, with clover hay, will constitute their ration until a month or so before lambing, when the roots will be somewhat reduced, and a little bran and oats added.

Swine. Breeding operations are restricted to Yorkshires, Tamworths, and Berkshires, though other leading breeds are represented in our experimental work.

Feeding Swine. Breeding sows, and young sows over six months, subsist largely upon refuse from the College kitchen, pulped mangels, and a very limited ration of mixed meal, usually about equal parts of middlings, barley, and wheat, with an occasional addition of oats. They are given exercise in a covered shed, and provision is being made for a pasture in summer. The kitchen refuse and roots are reduced about a month before farrowing. A ration composed largely of middlings and bran does very well for this period. When suckling pigs, they are fed liberally. One-third of their meal ration is usually

middlings and bran, and the remainder a mixture of grains. Skim-milk is also added when available and in a sweet condition.

Equal parts of finely ground barley and middlings, with skim-milk, does very well for young pigs. We usually wean pigs at from 6 to 8 weeks, and try to have them eating well before they are weaned. When skim-milk is not available, there is greater need for postponing weaning, and we have sometimes exceeded the limit given above.

Financial Statement.

The appropriations for the farm and experimental feeding departments were not kept separate during the past year, but in the statement which follows an attempt has been made to charge against the farm department only those things which properly belong to it. Also, credit has been given the farm for materials supplied to other departments, for which it received no equivalent.

Dr.		*Cr.*	
To inventory live stock, Jan. 1, 1901—		By sales of cattle	$1,693 56
Cattle	$3,755 00	" " sheep	598 82
Sheep	886 00	" " swine	1,776 09
Swine	635 00	" " horses	55 00
Horses	616 50	" " milk	160 93
" Permanent improvements	215 24	" " hides	8 92
" Wages	3,195 79	" " wool	24 86
" Purchase of stock	3,185 10	" Miscellaneous sales	21 67
" Maintenance of stock	600 00	" Service fees of male animals	211 00
" Seed	231 09	" *Dairy and Exp. Feeding Depts* :—	
" Repairs	385 90	3,485 bu. roots at 7c	243 95
" Furnishings	150 00	94 tons hay at $6	564 00
" Implements	196 94	250 tons silage at $2	500 00
" Postage, stationery, etc	15 00	Pasture for 35 cattle, 5 months at $2	350 00
" Fuel and light	30 00	" *College* :—	
" Binding twine	31 00	900 bags potatoes at 50c	450 00
" Contingencies	100 00	58,160 lbs. milk at 80c. per cwt	465 28
" Portable engine bought in 1900 (10 per cent. of $825)	82 50	Keep of 3 horses at $75	225 00
		Work of horse drawing sewage	50 00
		" *Experimental Dept.*:—	
		Keep of 5 horses at $75	375 00
		" *Garden Dept.*:—	
		Keep of two horses at $75	150 00
		" Loss on live stock through keeping many different breeds for educational purposes	400 00
		" Inventory live stock, Jan. 1, 1902—	
		Cattle	4,831 25
		Sheep	362 00
		Horses	797 00
To balance	642 27	Swine	689 00
	$15,003 33		$15,003 33

I have the honor to be,

Your obedient servant,

G. E. DAY,

Professor of Agriculture.

PART IX.

REPORT OF THE PROFESSOR OF HORTICULTURE.

To the President of the Ontario Agricultural College :

SIR,—I have the honor of presenting herewith my ninth annual report on the work of the Horticultural Department.

The many duties devolving upon the head of this department, usually requiring prompt attention, give but little time for relaxation; but the varied and interesting nature of the work has always been sufficient to make duty a pleasure. I am pleased to say that, on the whole, steady progress has been made throughout the year, although I regret that we have not accomplished so much as was desired, because of the lack of regular and competent assistance.

COURSES OF INSTRUCTION.

The class-room instruction given under the general head of Horticulture has embraced a course of about 30 lectures throughout the spring term to the students of the first year on the leading principles in the growth of trees; production of new varieties; methods of propagation; and general management of orchards and fruit plantations. For the first four weeks at the beginning of the fall term the new students were taken twice a week through the orchards, gardens, and other branches of this department, and the nature of the work was explained to them. This was done with a view of impressing upon them at the beginning of their course the importance of learning all they possibly could by using their powers of observation.

To the students of the second year, a course of about sixty lectures was given, two per week throughout the College year. In this course all of our Canadian-grown fruits were taken up and studied in detail; the subject of vegetable gardening was dealt with at length; and the latest and most approved methods of cultivation with the various crops was discussed. Landscape gardening and floriculture were taken up sufficiently to give students an intelligent idea of the principles involved in properly laying out and beautifying their home surroundings.

The instruction in the class-room in these subjects was supplemented by practical work throughout the year in the orchards, fruit plantations, vegetable gardens, on the lawn, and in the greenhouses.

In connection with the work in floriculture, the students were first required to become as familiar as possible with the different kinds of plants in the greenhouses; and, after some practice in methods of propagation, were allowed to propagate during their spare time whatever they wished, on the understanding that it might be taken with them when they went home in the spring. This plan of stimulating an interest in the work, as well as a love for flowers, proved quite satisfactory, as nearly every member of the class, upon leaving the College in April last, took with him a choice collection of house plants of his own propagation. We have no doubt these were gladly received by the sisters at home, who have not as yet had an opportunity offered them to take a course at the College themselves.

A short course of lectures in forestry was also given to the students of the second year, dealing more particularly with the forestry problems in Ontario, and with practical methods of growing trees and managing wood lots, shelter belts, wind-breaks, etc., on the average farm.

A more extended course in the same subject was given to the students of the fourth year, covering two hours a week throughout the fall term. In this class, the students themselves were required to give most of the lectures, using Prof. S. B. Green's admirable little book on "Forestry in Minnesota" as a text-book. This method of taking up the work we have found to be an excellent one with the more advanced students, as each one has to prepare his work carefully to lay it before the class, and the practice of taking charge of the class helps to develop self reliance.

Development of Department.

The development which has been made in this department of recent years well warrants the substitution of the more comprehensive name Horticultural Department for that of "The Garden," by which it was formerly known. The department, as now constituted, includes the orchards, vineyard, and small fruit plantations, the vegetable and flower gardens, the lawn and arboretum, the shelter belts and forestry plantations, and the conservatory and greenhouses, in all covering about eighty acres. On the greater part of this an immense amount of care and labor has to be expended annually to keep these various features of the work at all times in proper condition.

Teaching by Object Lessons.

The importance of not only keeping everything in good condition, but of being abreast of the times and adopting the latest and most approved methods in the work, may be understood when it is remembered that we have every year about 30,000 visitors during the month of June, and probably as many more at various times throughout the year, and most of these visitors are here to see and learn all they can by observation. We have realized the importance of this fact, and have endeavored to conduct the work so that, as far as possible, it may afford valuable object lessons for those who come to see; and we have reason to believe our efforts in this line have not been in vain.

Experimental Work.

In several branches of the work experiments have been in progress for a number of years, and much valuable information has been obtained, particularly with variety tests of small fruits, tomatoes, and various ornamental plants.

The young orchard set out five years ago was also planted with a view to gaining information as to the varieties of larger fruits best adapted to this locality. This orchard is made up of a large number of varieties of apples, pears, plums and cherries, and a few of the more tender fruits, such as peaches and quinces. During the past season, quite a number of the young trees began bearing, although this was what might be called an "off year" for such fruits.

Strawberries.

For the past six years we have been conducting an extensive variety test with strawberries. During this time two hundred and seventy five varieties have been included in the tests. Careful notes have been taken upon the habits of the plants and the character of the fruit of each variety, and every picking has been carefully weighed and recorded. In this way some valuable data have been obtained. One of the striking features of this work has been the great variation in the relative standing as to the yields of the different varieties from year to year. This shows clearly the folly of jumping at a conclusion from the results of one or two experiments, as it is only by taking the average of a number of experiments that conclusions, at all reliable, can be reached.

As an instance of this we may mention the two varieties at the head of the list this year and last. In 1900 Clyde held first place for total crop, while this year it has dropped to thirty-sixth place on the list. Wesley, which in 1900 stood thirtieth on the list, is at the top this year.

One of the most uniform in its yields has been Stone's Early. In 1896 this variety stood thirteenth; next year it was second; and in 1898 it was first. In 1899 it was again second; last year it was seventh; and this year it was third. Considering the large number of varieties included in the test, it has made a remarkably uniform and good record for productiveness; but, notwithstanding this, we have this year placed it on our list of varieties to be discarded, because of its small, soft, sour fruit.

As mentioned in our report last year, there are many points besides productiveness which have to be taken into account in selecting varieties of strawberries.

In the plant we look for vigor and freedom from disease, ability to propagate freely, and a pollen-bearing blossom. In the fruit we would like to find large size, smooth roundish form, rich red, showy color, firmness of flesh, and good quality. But to get all

these excellencies combined in one variety is the difficulty; for, notwithstanding the many varieties that have been tested, we are still looking for the ideal strawberry.

There is considerable variation in the season of ripening of different varieties, so that they may be classed as early, midseason and late; and, for this reason, as well as because of the difficulty of getting all the good qualities in one berry, we believe it is best for the grower not to restrict himself to less than half a dozen kinds, particularly if growing them for home use.

Were long tables not out of order in this report we would like to present a full report on the one hundred and seventy-five varieties fruited this year, but at present we must content ourselves by making a selection of a few of those which have proven most desirable. As the result of another year's test, we would not materially alter the list as given in last year's report, unless it might be to leave out Jocunda Improved, because of its lack of productiveness, and add one or two of the most promising varieties.

Among the leading early varieties are Sadie, Wesley, Anna Kennedy, and Van Deman.

Sadie has now been fruited here for four years, and it has made a good record not only for earliness, but for total crop. It is a vigorous grower and a good pollenizer for other early pistillate varieties. The berries are not large, but are round, plump, firm and of good color.

Wesley has also fruited here for four years, and this year heads the list for total crop. It is a very vigorous growing pistillate sort. The fruit ripens early and, although not very large, it is shapely, firm and of good color.

Both *Anna Kennedy* and *Van Deman* produce much larger and more handsome berries than the two varieties already mentioned, but they lack productiveness and vigor of plant.

Among the best of the mid-season varieties are Clyde, Irene, Warfield, Tennessee Prolific, and Williams.

Clyde made a much poorer showing this year than ever before, dropping to thirty-sixth place on the list; but for the three years previous to this it easily ranked as the best main crop variety. The plant is vigorous, the flower perfect, and the fruit large, well shaped, and fairly firm, but the color is hardly dark enough for a first-class berry.

Irene has again made an excellent record, doing much better this year than Clyde. It is a vigorous plant maker, but the blossoms are pistillate and require a perfect flowering variety like Clyde to furnish pollen. The fruit is of medium size, well shaped, firm, and of a handsome dark color.

Warfield has now been fruited here for six years in succession. It is an old standard that has its ups and downs, depending upon the seasons. In showery seasons it makes a great yield, but in times of drouth its leaves curl up and the fruit fails. It also is a pistillate variety, requiring an early flowering pollenizer, like Sadie or Van Deman, to furnish pollen for its early blossoms. The fruit is of medium size, firm, and of the dark rich color so much desired for canning.

Williams and *Tennessee Prolific* have also been fruited for six years, and have, on the whole, made very good records. Both are vigorous growers, bearing good sized firm berries. The Williams is now more extensively grown throughout the country than any other variety as a market berry, but its green tip detracts much from its appearance. Tennessee Prolific has not this defect.

Saunders, *Buster*, and *Satisfaction* rank among the best late varieties. Saunders has now been under test for six years, and is well deserving of a place in any collection for home use or market.

Buster and *Satisfaction* have been tested for four years. The former has made an exceptionally good record for productiveness. The berry is large but not firm enough or dark enough for a first-class berry.

Satisfaction, although ahead of Buster this year, has not, on the whole, proved so productive, but the fruit is firm, of fair size and handsome appearance.

Raspberries.

In our first plantation of raspberries, set out in 1895, there were about fifty varieties. A careful record has been made of the yield from these for the past five years, and an average of these yields gives a pretty good idea of the capabilities of the varieties under test.

Columbian and Shaffer easily head the list for productiveness. These varieties belong to the purple cane family, and are very vigorous growers, propagating by tip rooting like the black raspberries. The fruit is a dull-red or purple color, of good quality, but not showy enough for a market berry, although excellent for home use. Of the two varieties Columbian has proven to be a little hardier and slightly more productive than the Shaffer.

Of the bright red varieties, Marlboro', Cuthbert, and Loudon still rank among the best. Marlboro' begins fruiting a week or ten days earlier than Cuthbert; while Loudon is almost intermediate between the two. These are all fairly hardy here, are very productive, and the fruit is large, firm and attractive in the market.

One of the most promising new varieties which fruited here for the first time this year is the Herbert. This is a seedling introduced by R. B. Whyte, Ottawa, which shows decided merit. The plants are hardy, vigorous, and productive, and the fruit is large, showy, and of good quality

Golden Queen is the best of the yellow fruited varieties, and although not a market variety, it is a desirable one for home use, as its golden yellow berries lend a beautiful contrast to that of the darker colored varieties for table use.

Black Raspberries.

We have now twenty-five varieties of black raspberries in our collection, about half of which have been under careful test for five years. The following table shows those varieties which have stood near the top of the list during that time :

Rank	1897	1898	1899	1900	1901
1st	Palmer	Mammoth	Older	Hilborn	Eureka
2nd	Souhegan	Older	Gault	Palmer	Gault
3rd	Older	Gregg	Eureka	Kansas	Smith's Giant

From this it will be seen that there has been quite a number of varieties competing for first place, as no less than ten appear in this short table. Although it is difficult to arrive at a conclusion as to which is the most productive black raspberry, it is not difficult to determine which are a few of the best quality.

Older has proved to be one of the hardiest and until the last two seasons it usually stood near the head of the list for productiveness. The berries are very large, black, without bloom, moderately firm, juicy, and of good quality.

Eureka, which heads the list this year, has been fruiting here for five years, and has, on the whole, made an excellent showing. It ripens early and gives a long season of fruiting. The berries are large and fairly firm.

Gault, which stood second this year and also in 1899, has been fruiting for four years, and is also a large, firm, fine berry.

Smith's Giant is a new variety that originated with A. M. Smith of St. Catharines. The fruit is extra large, firm, and very late. This variety is evidently going to prove of value.

Currants.

The results of the experiments with currants the past season tend to confirm those reported last year. From among the thirteen varieties, which have now been tested for five years, Victoria, Fay's Prolific, and Belle de St. Giles may be selected as, on the whole, the most satisfactory red varieties.

Raby Castle and *Prince Albert* gave larger yields, but the berries are much smaller, and not so desirable for either home use or market.

White Grape still ranks as not only the best white currant, but every year, for the past five years, it has yielded about half as much again as the most productive red variety, and about three times as much as the heaviest yielding black variety.

Black Naples now ranks as the most productive of our black currants, although between it and Champion there is very little choice. Neither of them has proven so productive here as they should be, and we are looking for something better in our new plantation, which should begin bearing in another year or two.

This new plantation contains altogether forty-six varieties, and was set out late last fall. There are about seven hundred bushes in the plantation, and not one of them was lost in transplanting, which goes to show that fall planting is quite safe with currant bushes, at least when the conditions are at all favorable. The bushes this year have made excellent growth.

Gooseberries.

A dozen varieties of gooseberries, six of them American and six English, have been under test for five years in succession, and the results have been more uniform than in any other of our experiments. All of the English varieties have suffered every year from mildew, while none of the American varieties have been affected.

The following table gives the average yield per bush for the five year's fruiting :—

American Varieties.		*English Varieties.*	
Pearl	62.03 ozs.	Autocrat	8.49 ozs.
Downing	60 59 "	Crown Bob	6.57 "
Houghton	52.41 "	Whitesmith	5.01 "
Champion	35.56 "	Industry	2.67 "
Red Jacket	32.25 "	Triumph	1.18 "
Smith's Improved	14.52 "	Dominion	.25 "

From this it will be seen that in our experiments even the least productive of the American varieties, Smith's Improved, gave nearly double the yield of Autocrat, the most productive English variety, while Pearl, the best American variety, gave seven times the weight of crop of Autocrat

Pearl and *Downing* produce large greenish white berries, and are so nearly alike in all particulars that there is no necessity for growing them both.

Houghton, the oldest of the American varieties, produces a small red berry, and Champion, a small green berry, both of which are inferior to Pearl.

Red Jacket has not held out what it at first promised in the way of productiveness, but its berries are about one-half larger than those of Pearl, so that, on that account, it is well worthy of a place in any collection.

Smith's Improved is a light yielder, but bears a very sweet, medium-sized berry, that ripens a week or more earlier than any of the other sorts.

A new plantation of gooseberries, containing over 40 varieties, was set out last fall, and has made fair growth the past season This collection contains a number of hybrids between the English and American types, and we are looking forward with interest to the results therefro n.

Tomatoes.

For four years we have been conducting a variety test with tomatoes, in which fifty-five varieties have been included. Careful notes have been taken of the important characteristics of each variety, and records have been made at each picking of the weight of sound ripe fruit and rotten fruit. Account has also been taken of the amount of green fruit left on the vines at the end of the season. With regard to the unripe fruit, this varies with the different seasons; but, on the whole, it has not amounted to more than two or three pounds per plant.

The amount of rotten fruit, however, varies very much, not only with the season, but with the different varieties.

This year, there was comparatively little rot on any of the varieties; but last year when the rot was very prevalent, we had opportunity of noting its effect upon the different varieties, and it was found that while some kinds were quite exempt from the disease, others lost from one-third to one-half their crop from this cause.

In the following list is given a few of the varieties which have made the best yields :

Average results of four year's tests.

1.	Atlantic Prize	224 ozs. per plant
2.	Earliest of All	209 "
3.	Golden Queen	184 "
4.	Ignotum	147 "
5.	Paragon	146 "
6.	Aristocrat	117 "
7.	Dwarf Champion	113 "
8.	Livingstone's Beauty	108 "

Average results of two year's tests.

1.	Express	214 ozs. per plant
2.	Plentiful	180 "
3.	Prudy's Best	148 "
4.	Crimson Cushion	116 "
5.	Combination	114 "
6.	Fordhook Fancy	83 "

Average results of three year's tests.

1.	Mayflower	189 ozs. per plant
2.	Extra Early Advance	170 "
3.	Imperial	155 "
4.	Royal Red	152 "
5.	Longkeeper	147 "
6.	Ponderosa	145 "
7.	Fordhook First	141 "
8.	Trophy	137 "

Grown for one year only.

1.	Dominion Day	246 ozs. per plant
2.	Thorburn's Century	191 "
3.	Freedom	190 "
4.	Climax	183 "
5.	Magnus	171 "
6.	Success	126 "
7.	Earliana	111 "

From this list, Atlantic Prize, Earliest of All, Mayflower, Express, Plentiful and Dominion Day might be selected as a half-dozen of the most valuable varieties.

Co-Operative Experiments.

In connection with the Experimental Union, we have, during the past eight years, been carrying on a series of co-operative experiments with small fruits. The work was begun with sixty experimenters, and was at first beset with many difficulties and discouragements ; but, by persistent effort, we have overcome many of the early difficulties, and now have on our books the names of over one thousand experimenters in all parts of the Province, who are conducting, on their own farms, one or more of these tests with small fruits. During the time we have been engaged in this work, we have distributed : 2,256 currant bushes ; 3,220 gooseberry bushes ; 3,600 blackberry bushes ; 4,440 red raspberry bushes ; 4,440 black raspberry bushes ; and 25,008 strawberry plants,—making a total of 42,964 plants.

This large number of plants of the leading varieties distributed in small lots all over the Province, is having its influence in encouraging fruit growing in many places where it was never before attempted, and that our efforts are being appreciated we have abundant evidence in the reports of experimenters that are annually sent in.

The value of this work, however, cannot be given in a mere summary of the results of the different experimenters. The greatest value naturally accrues to those who conduct the experiments. A full account of the nature and results of the experiments will be found in the Experimental Union Report.

The work has grown to such an extent that some provision will have to be made for regular assistance if it is to be continued, as the nature of the work necessarily entails a large amount of clerical work upon the head of this department.

Fruit Exhibit at the Pan-American.

The laurels won by Canadians in the Horticultural, as well as in most other departments of the Pan-American Exposition, has been a matter of general congratulation. Our orchards here were not sufficiently in bearing to enable us to keep up a display throughout the season, as was done by other exhibitors, but we did what we could and sent about 100 jars of our choicest varieties of small fruits, such as strawberries, raspberries, currants, and gooseberries. These were put up in antiseptic fluids so as to preserve the fruit as nearly as possible in its natural state. This collection formed one of the central features of the Ontario exhibit during the greater part of the Exposition, and for it this Department was awarded one of the 35 bronze medals given to Ontario exhibitors.

Inspection of Fruit Experiment Stations.

The inspection of the Provincial Fruit Experiment Stations, now established in different parts of the Province, is another of the duties devolving upon me as head of this department. There are now fourteen of these stations, and they are so located that nearly every part of the Province has one or more such stations to which it may look for information as to the kinds of fruit best adapted to that section. As far as possible, each of these stations was visited at the most opportune time for seeing what was being accomplished. While visiting the stations I have had an excellent opportunity, not only of learning what progress was being made at the station, but of getting an intimate acquaintance with the status of fruit-growing in every part of the Province ; and the knowledge so acquired has been of incalculable value to me in my college work with the students. A full account of this work will be given in my report to the Board of Control of the Fruit Experiment Stations.

Meetings Attended.

The holding of Orchard Institute meetings this year in the ten different parts of the Province was a new departure in institute work, that proved very successful. These meetings were arranged for by the Director of Institutes and were mostly held at the fruit experiment stations. At his request, I attended eight of the meetings, and gave addresses and led discussions on various questions connected with orchard management. As these meetings were held right in the orchards, such operations as grafting, budding, pruning, spraying, cultivating, etc., were usually practically illustrated. The meetings I attended were at :

The Burlington Fruit Experiment Station, at Mr. A. W. Peart's, Burlington ; Mr. J. Elliott's orchard, Agincourt ; the Simcoe Fruit Experiment Station, at Mr. G. O. Caston's, Craighurst ; the Bay of Quinte Fruit Experiment Station, at Mr. W. H. Dempsey's, Trenton ; the South-western Fruit Experiment Station, at Mr. W. W. Hilborn's, Leamington ; the Huron Fruit Experiment Station, at Mr. A. E. Sherrington's, Walkerton ; the Grimsby Fruit Experiment Station, at Mr. L. Woolverton's, Grimsby, and at the Georgian Fruit Experiment Station, at Mr. John Mitchell's, Clarksburg.

Besides these, I attended a joint meeting of the Hamilton Horticultural Society and the City Improvement Society, at Hamilton, and gave an address on "The Beautifying of Lawns and Gardens" ; a meeting of the Guelph Horticultural Society, where I gave a talk on "Window Gardening" ; the annual meeting of the Fruit Growers' Association held at Cobourg, where I presented a report on the New and Seedling Fruits examined during the year ; and the annual meeting of the Experimental Union, where I gave a report on Co-operative Experiments with Small Fruits.

Acknowledgments.

In conclusion, I beg to acknowledge with thanks the following donations to this department during the past year :

Brown Bros. Co., Brown's Nurseries, Ont., twenty-four blackberry and fifty five black currant bushes.

F. W. Porter, Mount Forest, seedling gooseberry bushes.

C. L. Stephens, Orillia, seedling gooseberry bushes.

S. Spillett, Nantyr, "Green Chisel" gooseberry bushes.

Rev. E. B. Stevenson, Jordan Station, seven new varieties of strawberries.

A. M. Smith, St. Catharines, two "Toronto" peach trees.

W. H. Dempsey, Trenton, scions of fourteen varieties of apples.

Jas. Goldie, Guelph, collection of hardy perennials.

Respectfully submitted,

H. L. HUTT,

Professor of Horticulture.

PART X.

REPORT OF PROFESSOR OF BACTERIOLOGY,

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith a brief report of this year's work in the department of Bacteriology.

My assistant, E. W. Hammond, D.V.S., left me at the commencement of the year to accept a position with the City Dairy Company of Toronto, and his place was not filled until the end of June, when I was fortunate enough to secure the services of H. Streit, D.V.M., of the University of Berne, Switzerland. Dr. Streit had formerly been the assistant of Prof. Dr. Guillebeau in the Veterinary School at Berne, and the excellent training he received there fitted him well for both research and routine work in a Bacteriological Laboratory.

LECTURES.

The usual course of lectures to the Second Year on Bacteriology and its relation to Agriculture and Dairying, was given in the winter semester, and I think the time has now arrived to give some laboratory instruction along these lines. Unfortunately, however, the accommodation is too small at present and the resources of the laboratory too limited to attempt work of this character.

The special dairy class monopolized nearly all my time during the winter semester. The class was large, the laboratory small, and the apparatus and appliances meagre; consequently the students had to be divided into six divisions, and the same work repeated six times. I trust that a different arrangement will be made in the near future, as the waste of time last year was very great and the wants of other classes had to be sacrificed. The specialists in Agriculture and Dairying now take more or less bacteriology. Lectures and laboratory work form part of their course, the aim being to give them a good grounding in general bacteriological work, and special training along their respective lines. The only graduate of last year took his thesis in my laboratory.

PUBLICATIONS AND PERSONAL VISITS, ETC.

During the year the following papers have been issued: "The Ripening of Cheese, and the Rôle of Micro-organisms in the Process."—Transactions of the Canadian Institute, 1900, pp. 103-134.

"The Agglutinating Substance."—Centralblatt für Bakteriologie, 1900, Abte. I.; and several articles in the agricultural press of the Province.

Personal visits were made to Innerkip, to investigate the cause of bitter cheese in the East Zorra factory; to Bradford, to inquire into the reasons for an epidemic among the fowls in that locality; and, in the absence of Prof. Lochhead, I went to Streetsville, with a view to trace the cause for the bad rusting of cereals in that district. A report of this was made to Prof. Lochhead, and reference was made thereto in a publication of the Biological Department "On the Grain Rusts."

I gave an address on "Milk as an Agency in the Conveyance of Disease," to the South Wentworth Women's Institute, and also two lectures to the pupils of the Ontario Normal School of Domestic Science at Hamilton.

I have also given two lectures to the patrons of the Innerkip factory "On bitter milk and cheese."

INVESTIGATING DISEASE AMONGST POULTRY.

Mr. W. L. Smith accompanied me to Bradford and gave the results of the trip to the readers of the "Sun," as follows:

"Some little time ago Superintendent Graham, of the Poultry Department of the O. C. A., made an investigation in the section about the lower end of Lake Simcoe, where such serious losses have occurred in poultry during the last few years. Just how

serious these losses have been will be understood from the statement made by one of the losers. James Ferris in one season lost no less than 300 fowls, and this year he has lost 100 out of 200. This is possibly one of the most serious cases of the lot; but over a district probably ten miles one way by five or six the other, losses more or less serious have been sustained in nearly every farmyard during the last four or five years—the losses in some cases extending back over a period of seven or eight years.

"When Superintendent Graham inquired into the trouble early in July, he was of the opinion that the outbreak was of the nature of cholera; but, a bacteriological examination by Prof. Harrison of the carcasses of some of the fowls that died of the disease, showed that all the deaths were not due to the same cause; in fact, in none of the cases examined by Prof. Harrison was death due to true cholera. In some cases worms were present in the intestines, and these were, apparently, either a prime or secondary cause of death.

"In order to secure the fullest possible information on the case, Mr. Harrison last week visited the infected district himself, and inspected a number of yards where losses had occurred. In all of these the fowls, at times, have access to stagnant water in the barnyard, and the hen-houses, while kept in fairly good condition, contained more or less of the droppings of the fowls.

"Many of the owners of the premises in which these conditions exist have, ever since the disease first appeared in their yards, been spending time and money in an effort to cure that disease

"'What is really required,' said Prof. Harrison, in referring to this fact, 'is not a cure for the disease, but the removal of the causes which ensure its continuance—the prevention of access to foul water in the barnyard, and the thorough and regular cleansing of the hen-houses being the first steps necessary in that direction.'"

"'But present conditions as to water, etc., have always existed; then why should these cause greater trouble now than in the early days?'

"This is the answer almost invariably made to statements such as the foregoing.

"In answer to this, and speaking on the general question, Prof. Harrison said: 'When a country is new, before it has become fouled with habitation, things may be done with impunity which cannot be done later on without entailing the most serious consequences. Take a military camp, by way of example. The very first thing done when such a camp is being established is to prepare latrine-trenches, which serve as water-closets. Guards are also placed on water supplies in order to prevent contamination. Despite these and other precautions, the camp ground soon becomes foul, and troops, save in the stress of necessity, seldom remain long in the same place.'

"*How Disease is Spread.* Precisely the same state of affairs exists in a barnyard. In the course of time disease germs of various kinds are deposited there, and unless the most thorough precautions are taken as to cleanliness, these germs will develop and multiply with disastrous results. In the case of worms in fowls, the eggs pass off through the droppings, and are then picked up by other fowls, and reproduction goes on. The same in the matter of germs. These are spread around the barnyard, and develop and multiply in the stagnant water. All the conditions necessary to the development and multiplication of disease are, in fact, soon present, unless everything that can be done towards keeping the place in proper sanitary condition is done.

"*Removal of Droppings and Whitewashing.* 'What should be done to put poultry yards generally in proper sanitary condition?' I asked.

"'The very first thing,' replied Prof Harrison, 'is to see that the roosts, laying-boxes, and floors,—in fact, all parts of the poultry house,—are scraped thoroughly clean. When this has been done the place should be whitewashed with a solution made in the proportion of 20 gallons of lime water to one gallon of crude carbolic acid. The lime used for this purpose should be fresh, and dissolved in sufficient water to reduce it to the consistency of milk. The material may then be applied with a sprayer, and should be applied to every part of the buildings occupied by the poultry. In addition to this, the fowls should be absolutely prevented from obtaining access to foul water. Even if a sufficient supply of fresh water is furnished hens, they will sometimes take the dirty water. It would be well, indeed, if poultry houses could be put up apart from the ordinary farm buildings altogether. The model plan is that adopted in some parts of

England, where poultry houses are moveable structures that can be removed from place to place. Under this system hens are not kept on foul ground, and during the summer, by removing from place to place, the cost of feeding is materially reduced; but, whatever else is done, prevention from access to foul water is one of the first essentials to the healthy condition of fowls.'

"*Where the Use of Gravel Comes in.* Mr. John Ferris, one of those who has suffered least from the local trouble, has used fresh gravel extensively in his yard. He has used this as a covering in some places which would otherwise be damp and more or less foul; he has also used it freely for the purpose of furnishing grit for the fowls—a load of gravel serving one hundred hens in his case for about six weeks. His practice is to dump a load in the yard, and when the hens are fed to rake the grain into this gravel, thus compelling the hens to scratch for their living, and at the same time ensuring the taking in of a certain amount of grit with the grain by the fowls.

"'That is a good thing to do,' said Prof. Harrison, speaking in regard to this matter. 'Hens require grit in order to digest their food properly. I do not think it is a good thing to put down so much in the feeding place at one time, as the droppings accumulate more or less in this, and these furnish a possible source of contagion. It would be better to have a fresh supply of gravel every week (every day perhaps not practical). This gravel, however, is not a cure for the disease. The purpose it accomplishes is to assist in the digestion of the food; and, by so assisting, it tends to keep the birds in a good healthy condition; and anything that does this assists in providing resisting power against disease. We must remember that amongst poultry, as well as in the human family, disease is sometimes present in a latent form. You will sometimes find diphtheria germs in the throat of a perfectly healthy man. Those germs may never develop; but reduce that man's vitality from any cause, by exposure to dampness, by cold, or even by over-exertion, and the germs may develop into a virulent form of disease. The same is true in regard to hens. When they are reduced in vitality, from any cause, they are liable to attacks from disease, which they would throw off if the general conditions were kept up to the standard.

"*How Natural Conditions Tell.* 'If it were not for the wide range which fowls have over the open fields on the average farm, conditions would be very much worse than they are. During the summer time, for fourteen to sixteen hours per day, fowls have a range over hundreds of yards of clean ground. This enables them to resist the influences which surround them during the night when in premises which are not perfectly clean. If they were kept in confinement all the time, where these conditions are ever present, trouble would soon break out. What is required is to secure for the fowls, as nearly as possible, the natural conditions surrounding wild bird life. These are: Pure water, uncontaminated ground, and plenty of air and sunlight. The latter are of special importance. The windows in most poultry houses are not large enough and are too high up. They should be so placed as to allow the sunlight to reach every part of the premises occupied by the fowls. The sun is, after all, the greatest purifier we have.

"*To Facilitate the Work of Cleaning.* 'As a means of keeping houses clean, there is nothing more effective than the placing of boards beneath the roosts for the catching of droppings. This greatly facilitates the work of cleaning. If land plaster is placed on these boards, after the droppings are scraped off, it will absorb the liquid in the droppings, and add to the fertilizing value of the material. These droppings, mixed with plaster, make an excellent fertilizer, and are particularly valuable for plum trees. In a word, what is required is not a cure for the disease, but a removal of the causes which perpetuate disease. This may be accomplished by keeping hen houses thoroughly cleaned; whitewashing freely with lime and carbolic acid; making sure that the hens have access to nothing but pure water; furnishing free access to ground that has not been contaminated; and providing suitable food, with plenty of grit to assist in its digestion.'"

Laboratory Work.

During the year (10½ months), 188 doses of tuberculin and 114 starters, or cultures, or cheese and butter-making have been sent out.

Diagnoses, or bacteriological analyses, of the following substances have also been made and the results reported directly to those sending the material:

Milk with bad odours, or tainted	11
Bloody milk	1
Milk suspected of conveying disease	4
Unchurnable cream	1
Water	18
Off-flavored cheese	14
Off-flavored butter	7
Foul brood	3
Diseased organs	7
Anthrax	2
Symptomatic Anthrax	1
Diseased hens and turkeys	29
	98

The above does not include the large number of analyses (320) of milk, can-washings etc., made for patrons of the East Zorra factory in the county of Oxford.

Copies of the following circular, slightly altered from the one sent out from the Bacteriological Department in 1899, were sent to all cheese and butter factories in the Province, and the effect of this announcement may be seen in the large number of samples which were sent to the College:

Assistance Offered to Creameries and Cheese Factories.

It is the wish of the Bacteriological, Chemical, and Dairying Departments of the Ontario Agricultural College to get into touch with the makers in the cheese factories and creameries of the Province, with a view to rendering assistance in cases of difficulty which may be due to undesirable bacterial or other infections.

Difficulties frequently arise; and we might mention a number of cases to show that within the last two years certain troubles or affections in factories were found to be caused by infection with harmful bacteria. The following may be mentioned as some of the most frequent causes of trouble:

Principal Causes of Troublesome Bacterial Infections in Cheese Factories.

Defects in the factory itself. In new or modern factories there are not likely to be any grave defects in the building; but in some of these constructed years ago, there may be defects in construction, or needed repairs may be neglected. Probably the commonest defects are:—

(1) Leaky floors, which allow whey or other liquids to drop through and decompose, giving rise to bad odors and very undesirable kinds of germ life that get into the vats and cause serious trouble.

(2) Flies, which are a great nuisance in factories, as they feed or walk upon all kinds of decomposing materials and then visit the cheese factory, crawling over or dropping into the milk and depositing various kinds of germ life, which are thus placed in situations favorable for further growth and development.

To avoid the trouble from leaky floors many of the best factories in the United States and Canada are putting in cement floors.

Faulty Equipment. Great care should be taken to buy good utensils and see that they are kept in repair. The joints of the tinware are often badly soldered and in some places not soldered at all. All joints should be made by lap-jointing and soldered flush with the tin. If this is not done, small spaces are left which it is impossible to keep clean and sweet; and these become so many crevices for the development of germ life.

Bad Drainage. Several examples of bad flavored cheese caused by germs in drainage filth have occurred during the last two years. In these instances the drains have usually been blocked, or have not had sufficient fall to take away the drainage quickly. Consequently masses of putrid material, whey or buttermilk, have collected in certain parts of the drain and have given rise to trouble in the factory.

Defects in Cheese.

Gassy Fermentations. This is the worst and commonest trouble in cheese factories, and is caused by bacteria breaking down the sugar in the milk and producing gas therefrom. This gas causes the appearance known to cheese makers as pin hole or gassy curds. These harmful germs gain admittance to the milk in the process of milking or after the milk is drawn from the udder. Particles of manure, stagnant water, and dirty pastures contain this class of gas producing germ in large numbers; and it is easy to see how they gain access to the milk by careless milking. Cows lying on the ground or walking through stagnant water get their hairy coats seeded with these noxious forms; and they are dislodged from the animal's coat into the milk pail by the movements of milking. The high temperature at which milk is usually kept during the summer favors their growth and they consequently become very numerous in the milk. We have recently made several analysis of water sent from cheese factories, and have found therein large numbers of gas-producing germs.

To avoid as far as possible the contamination from milking it is advisable before commencing:—

(1) To brush well the cow's udder and that part of her thigh, flank, and side next to the milker.

(2) To rub the udder and teats carefully with a clean, damp cloth.

Bad Flavors. There are many well known defects in cheese, generally indicated by such expressions as "off flavor," "not clean flavor," "tainted," "goose flavor," "yeasty," "bitter," etc, all of which are abnormal flavors due, in the majority of instances, to noxious bacteria gaining access to the milk—sometimes by carelessness in milking, as explained above; sometimes from dirty whey tanks; sometimes from carrying sour whey in milk cans; and other times from the use of contaminated well-water.

The cheese in an eastern factory was pronounced "off flavor," and an examination revealed the fact that the germ causing the trouble was in the well-water which was used in setting the vats. The water had acted as a starter; and a change in the water supply at once removed the trouble.

The high temperatures of curing rooms in the summer time favor the growth of many of these undesirable germs in cheese.

Color or Pigment in Cheese. A number of abnormal changes manifested by the production of various colors in cheese are caused by bacteria. A common result from such bacteria is red or rusty cheese, the discoloration being noticeable on the edges of the particles of curd. Blue, black, and green cheese are also caused in this way, but not so frequently.

Mottled or discolored cheese likewise belongs to this category.

Difficulties in the process of Manufacture of the Cheese.

Imperfect Coagulation. Cases where normal coagulation could not be secured have been found to be due to lack of lime in the milk and to the alkali nature of the water used in setting the vats.

Loss of Fat. In some sections, at certain seasons of the year, abnormal loss of fat occurs for which no good reason can be given.

Preservatives. Where it is suspected that some preservative has been used to keep the milk sweet, a sample may be sent in for examination.

Defects in Butter.

Lack of Flavor. This trouble is often due to the absence of the proper flavor-producing organism, a condition which is overcome by the use of a culture. In a lengthy research on the flavor of butter caused by the bacteria commonly found in milk, we separated some twenty different species, made starters from each species, and inoculated pasteurized cream therewith, in order to ascertain the effect of each individual species on the flavor of the butter. In the majority of the cases the butter lacked flavor; and in six instances it had a very undesirable taste.

"*Putrid Butter*," "*Lardy Butter*," "*Bitter Butter*," "*Fishy Butter*," *etc.* The peculiar tastes or flavors of all these varieties are caused by the presence and growth of undesirable bacteria in the cream.

Having thus briefly referred to some of the more common defects in factories, and the causes of many of the troubles in the manufacture of butter and cheese, we may emphasize the fact so often stated, viz., that the markets of the world are becoming more and more particular and want nothing but prime articles. Hence it is necessary to make and export only the best produce.

Samples.

In order to help makers we are prepared to undertake the bacteriological and chemical investigation of any of the above or similar troubles. Whilst it is manifestly impossible for us to investigate every difficulty which may arise, we are willing to inquire into all serious troubles, or all cases in which the trouble is continuous. We shall do our best to find the cause and suggest remedies.

With this object in view, we ask that samples of milk, butter, or cheese injuriously affected in any way be at once sent to the Dairy department, with a letter giving all details as fully as possible. Large quantities need not be sent; but care must be taken to send samples which fully represent the trouble complained of. About two ounces of butter or cheese and three or four ounces of milk, whey, or buttermilk are sufficient; and if properly packed they may be sent by mail.

If any doubt arises as to the purity of the water used in the factory, send it to us and we will examine it for the presence of gas-produing germs and as to its general suitability for factory use. Send about four ounces in a clean bottle that has been thoroughly washed out with boiling water. Where an exhaustive analysis is necessary, more water will be required. In such cases the examination will be both chemical and bacteriological; and the following directions are given :—

Samples of Water for Analysis.

Container. A bottle of not less than one-half gallon capacity is to be used, preferably one with a glass stopper. If there is no glass stopper, the bottle must be fitted with a new cork.

Preparation. The bottle must be thoroughly cleaned, all foreign substances being removed. Then it must be scalded out with boiling water, and allowed to drain until cool.

Taking of Sample. If the sample is to be taken from a well, the water must be pumped out for about five minutes, or long enough to empty all pump connections, before the sample is taken; if from a tap, the water must be allowed to run to waste for about ten minutes, or long enough to empty all local laterals, before sampling. Water standing in the pipes in a house is under very favorable conditions for the multiplication of bacteria. If, therefore, the precaution of running off the water be not taken, a very erroneous conclusion as to the number of bacteria present, may be drawn. If the sample is taken from a lake or stream, it must be taken some distance from the shore, the sampling vessel being plunged, say, a foot and a half below the surface, to avoid the surface scum. Samples are not to be taken immediately after a storm. Wherever the sample is taken from, the bottle must be rinsed out several times with the water to be analyzed before the sample is taken. The bottle must not be filled quite full; a small space must be left for the expansion of the water. It must be tightly corked and a piece of cloth tied over the neck to keep the cork in place. Sealing wax must not be used.

Packing. The bottle must be packed in ice. The water should arrive at the laboratory at, as nearly as possible, the same temperature as when the sample was taken.

Notification. Send notice by mail stating by what express company you are sending the water, and the date of the shipment. Also give as fully as possible the history of the well or source of the water, and remarks on the sanitary surroundings.

Note. On application a suitable bottle, properly prepared, will be sent to the applicant.

Personal Visits.

In cases where the affection is a serious one, a personal visit may be necessary, and will be made.

Cultures.

A second branch of our work, which we think will be of benefit to makers, is the manufacture of good cultures for use in making both butter and cheese. At present none of these are made in Ontario; and although they may be procured from the United States, the duty and consequent trouble prevents many from using them.

We, therefore, announce that a culture which possesses good flavor and aroma will be sent to any who apply for it. Applicants must state whether they want it for cheese or for butter.

In order to pay the cost of bottle, mailing case, postage, etc., the small charge of twenty-five cents per bottle will be made. Stamps will be taken instead of money, if it is more convenient for the applicant.

Application for cultures should be addressed to F. C. Harrison.

Alkaline Solutions.

Recognizing the value of the alkaline solution to the factoryman, and the difficulty he has had in obtaining it, we offer to furnish the solution to those who want to make use of it at a nominal cost of $1 per gallon. When 10 c. c. of milk or cream is taken as a sample, one gallon of the solution will make about 400 tests. Applications for this solution should be addressed to R. Harcourt, Chemical Department.

Money or stamps must in all cases accompany the applications for cultures and alkaline solutions.

H. H. Dean,
Prof. of Dairy Husbandry.
F. C. Harrison,
Prof. of Bacteriology.
R. Harcourt,
Assoc. Prof. of Chemistry.

Ontario Agricultural College,
Guelph, April, 1901.

Assistance Offered to Veterinarians and Farmers.

For the year 1902, I would supplement the circular issued to dairymen by offering assistance to veterinary surgeons and others interested in the care of live stock.

There is in connection with the Provincial Board of Health a laboratory for research work in human pathology; but at present there is not any laboratory in the Province devoted to the solution of the problems which are constantly arising in the veterinary art. In many cases, we might, we think, give material aid, by investigating the *cause* of a disease, or in diagnosing obscure cases. We are enabled to do this because of our laboratory appliances. No veterinary surgeon or stock man keeps high power microscopes, incubators, and the other necessary laboratory apparatus for bacteriological or pathological work; and yet these are often essential to a correct diagnosis of the diseases of live stock. We shall mention in order a few points on the subject of what to send and how to send it.

In cases of disease,—send the organ or material, carefully wrapped in an antiseptic wrapper, giving full particulars regarding it. It is best to send by express; and in summer it may be necessary to pack in ice.

In cases supposed to be or suspected of being:

Anthrax,—send an ear, or some of the blood, spleen, or liver of the dead animal.

Symptomatic Anthrax, Black-leg, or Quarter Evil,—send the parts infected, as this disease is usually in the muscles.

Malignant Œdema (similar to black leg, but showing more fluid in the subcutaneous tissues, which, unlike the fluid found in cases of black leg, is almost colorless),—send the part affected.

Tetănus or Lockjaw,—on account of the difficulty of finding the bacillus of this disease, it is almost useless to send material, unless the point of inoculation is known, in which case, cut away and send the flesh around the point of inoculation.

Glanders (a disease which affects either the nasal passages or the skin, in the latter case called *Farcy*),—send some of the ulcers from the parts infected, or of the discharge from the nasal passages

Hog Cholera and Swine Plague,—send any diseased portions of the animal.

Actinomycosis, or Lumpy Jaw,—send in a bottle a little of the matter found in the tumor mass.

Rabies, or Hydrophobia,—send the base of the brain or *medulla oblongata* of the animal suspected.

Tuberculosis and Pseudo-Tuberculosis,—send any tubercles or diseased glands.

In cases of diseases affecting poultry, such as Chicken Cholera, Roup, Tuberculosis, or Blackhead,—send the whole bird.

Research Work.

The research work undertaken during the year is as follows :

1. The difference in the bacterial content of milk heated to 140°, 160°, 185°, and 200° F., in conjunction with Prof. Dean See Prof. Dean's report, Part VII. of this volume, and a special bulletin by Prof. Dean and myself.

2. Research on the effect of cold storage on the bacterial content (total number of bacteria) of Cheddar cheese, in conjunction with Professors Dean and Harcourt. See Prof. Dean's report.

3. Research on the ripening of cheese and the rôle of micro-organisms in the process, in conjunction with Prof. Harcourt and with the assistance of the College cheesemaker, through the courtesy of Prof. Dean

4. On the duration of the life of the tubercle bacillus in Cheddar cheese.

5. An investigation of the causes which produce bitter cheese.

6. The gas-producing bacteria found in milk, and their effect on the making and ripening of Cheddar cheese.

Of the above, Nos. 1 and 4 are completed. The results of No. 1 will shortly be issued in bulletin form ; and No. 4 is ready for publication ; but there is considerable work yet to be done on Nos, 2, 3, 5, and 6.

In closing this report, I should like to place on record my appreciation of the services of my assistant, Dr. Streit. He has been faithful, efficient, and conscientious in all the work entrusted to his care.

Respectfully submitted,

F. C. HARRISON,

Professor of Bacteriology.

PART XI.

REPORT OF EXPERIMENTALIST.

To the President of the Ontario Agricultural College :

SIR,—I have the honor of submittting herewith my report of the work done in the Experimental Department during the year 1901.

AGRICULTURE IN EUROPE.

Within the past year, I have visited upwards of fifty of the leading Agricultural Colleges and Experiment Stations in Germany, Switzerland, and Austria Hungary ; France, Belgium. and Holland ; England, Scotland, Ireland, and Wales. Having spent my boyhood days on a farm, having devoted the past fifteen years to agricultural experiment work in Ontario, and having visited twenty-one Agricultural Colleges and twenty-three Experiment Stations in the United States, I greatly appreciated the opportunities of the past summer. A few observations regarding the agriculture of the different countries might not be out of place in connection with this report.

From the complete and comprehensive system of agricultural education given in some of the European countries, we have much to learn. In France, for instance, agricultural instruction forms an important part of the general system of the public education,—the pupils starting their agricultural studies in the public schools when only seven years of age. In carefully systematized and thoroughly conducted scientific research directed along special and well defined lines and continued for long periods of time, some of the European Experiment Stations were pioneers in the work and are leaders to the present day. In the investigation of seed, the improvement of farm crops, and the production of beet sugar ; in the economical use of land and the thorough cultivation of the soil ; in the management of the forests and the construction of good roads we can also obtain valuable lessons from the people of Europe.

Europe is doing much for agricultural science ; America is doing much in the *application* of agricultural science to *practical* agriculture. I could not find so close a relationship between the scientific and the agricultural world in any of the countries of Europe as I find in America, and especially in our own Province of Ontario. In higher agricultural education for farmers' sons ; in Agricultural Experiment Station work for the farmers ; in co-operative experiments in agriculture by the farmers themselves ; and in a complete and comprehensive system of Farmers' Institute meetings, I have failed to find anything either in Europe or in the United States, equal to what we have in Ontario. Generally speaking, the farmers of Ontario own the farms which they manage, and hold a position among their countrymen which is good socially, intellectually, and financially. They take a keen interest in the application of those methods suggested by science or by practice which tend toward the advancement of agriculture.

FIELD EXPERIMENTS AT THE O. A. C.

The practical work in the Experimental department consists in planning the various experiments ; laying out, seeding, and looking after the field plots ; harvesting, threshing, and weighing the grain ; taking up, weighing, and storing the potatoes and roots ; cutting, weighing, and harvesting the grass, clover, corn, and fodder crops, etc. ; and also in picking by hand the samples of grain grown on the plots, some to be sown on the plots the following year, and some to be distributed for co-operative experimental work throughout Ontario But few people realize what a large amount of very careful thought is required in planning, examining, and supervising these experiments, and in studying and summarizing the results for presentation in reports, bulletins, newspaper articles, and lectures.

EXPERIMENTAL GROUNDS.

About fifty acres of land, divided into something over 2,000 plots, is used for agricultural field experiments, conducted with varieties of grain, root, tuber, grass, clover,

fodder, silage, and miscellaneous crops; with artificial, green, and farm-yard manure; with methods of cultivation, selection of seed, dates of seeding, etc., all with the greatest care and for several years in succession, in order to secure strictly accurate and reliable results. These experiments deal with the crops grown on over nine-tenths of the cultivated land in Ontario; that is, fully 10,000,000 acres.

Experimental Plots.

The experimental grounds have a gentle slope toward the southwest, and the soil is what might be termed an average clay loam About one-quarter of the land is manured each year with twenty tons (about twelve loads) of farm-yard manure per acre. It will thus be seen that the land receives farm-yard manure once every four years. No commercial fertilizers are used, except in distinct fertilizer experiments, which occupy from two to three acres each year, and on which tests are made to ascertain the comparative value of different fertilizers with different crops. The plots vary in size according to the requirements of the different experiments, and the yields per acre are determined from the actual yields of the plots in every instance.

Instruction to Students.

All first year students are taken to the experimental grounds in the fall term and in the class room in the winter term, and the experimental work is explained to them. Besides this, the students of both the first and second year help in the various operations of the department, for which they are paid from four to nine cents per hour. In this way our students become acquainted with many of the results of our field experiments, observing the advantages which come from cultivating and manuring the soil in certain ways, sowing seed of different selections, and growing the best varieties of grain, corn, roots, potatoes, grasses, etc. They also become interested in experimental work, and afterwards prove themselves our most successful co-operative experimenters on their own farms.

Farmers Conducting Experiments.

The system of co-operative experiments in agriculture which is conducted conjointly by the Experimental department of the College and the Ontario Agricultural and Experimental Union, is doing good service for the Province. In 1886, twelve of the ex-students of our College conducted practical experiments on their own farms and eight of this number furnished satisfactory reports of results obtained. From that date there has been a steady and substantial growth of the co-operative work in agriculture, and this year there were about three thousand ex-students and other Ontario farmers who conducted experiments at their own homes. For the results of the co-operative experiments, the reader is referred to the annual report of the Ontario Agricultural and Experimental Union, which is printed and distributed by the Department of Agriculture, Toronto, Ont.

RESULTS OF EXPERIMENTS.

All our field experiments are conducted for at least five years before any of them are dropped. For the results of many of the tests which were carried on for five years previous to 1901, the reader is referred to former reports. The results of some of the experiments which have as yet been conducted for only one or two years are held back until the tests can be carried through another summer. As different seasons vary so much in temperature, amount of rainfall, etc, the average results of experiments continued for several years are of much greater value than those secured from only one year's work. We submit the results with much confidence in their reliability, and in their real practical value. The writer has good reason to believe that the work of the experimental department is being appreciated by the farmers of the Province, and that the results are being studied more and more each succeeding year. I shall limit my remarks on each separate experiment to a few of the points which seem to be of the greatest general value to the agriculture of Ontario.

Seed Grain Selections.

Within the past eight years a large amount of very careful work has been done to determine the influence of different selections of seed upon the resulting crop. The reader's attention is directed to the results of this experiment, which are becoming more valuable from year to year, owing to the increasing number of times that the experiment has been repeated. Fresh seed has been taken each year from the grain grown in the Farm department. It will, therefore, be understood that whatever difference there is from the influence in the selection of seed, that difference is attributed purely to the size and the selection of the seed for the separate years in which the tests were made. For the large plump seed, none but well developed grains were selected; for the small plump sample, the grains selected were of a uniform character, and for the shrunken sample, none but shrunken grains were used,—the last selection being made regardless of the size of the kernels. The sample of broken grain in the case of barley contained nothing but grains which were broken crosswise; split grain in the case of winter wheat contained nothing but grains which were broken lengthwise, and split seed in the case of peas contained peas which were split, but not broken. The grain from which these selections were made was all threshed with a grain separator, and the splitting and the breaking of the grains was, therefore, done in the usual process of threshing. In the selection of a large plump seed, one-half pound was carefully weighed from each class of grain. The number of large plump seeds of each kind of grain was then counted, and a corresponding number was taken of the medium-sized grain, the small plump grain, the shrunken grain, and the broken grain. The different selections were sown upon plots of similar size. The average results of this experiment are here presented in tabulated form :—

Results of experiments in seed grain selections repeated in each of 5, 6, 7 and 8 years.

Class of grain.	Number of years that tests were repeated.	Selections.	Weight of grain per measured bushel.	Average yield per acre (from 5 to 8 years.)	
				Tons of straw.	Bushels of grain (by weight.)
			lbs.		
Oats	7	Large seed	33.2	1.9	62.0
		Medium-sized seed	32.2	1.8	54.1
		Small seed	31.8	1.8	46.6
Barley	6	Large plump seed	49.5	1.5	53.8
		Small plump seed	48.8	1.5	50.4
		Shrunken seed	49.1	1.4	46.0
		Broken seed	48.6	1.3	43.2
Peas	5	Large seed	57 8	1.3	30.3
		Small seed	57.6	1.1	23.9
	8	Sound seed	59.3	1.4	30.7
		Split seed	58.7	.6	10.0
Spring wheat	8	Large plump seed	59.1	1.4	21.7
		Small plump seed	58.3	1.3	18.0
		Shrunken seed	56.9	1.2	16.7
Winter wheat	5	Large plump seed	59.5	2.4	42.4
		Small plump seed	59.3	2.0	34.8
		Shrunken seed	59.3	1.9	33.7
		Split seed	53.8	.5	8.0

On examining the average results for the number of years during which this experiment has been conducted, the reader will see that the large plump seed gave the largest

yield of grain per acre with oats, barley, peas, spring wheat, and winter wheat; and also that large plump seed produced grain which weighed more per measured bushel than any other selection with each of the grains under experiment. As the splitting of the peas and winter wheat is apt to have injurious effects upon the germs, the yields from seed thus damaged are very poor. The table of results here presented is worthy of very careful study by those who wish to have increased success in grain production.

Continuous Selection of Seed Oats for Nine Years in Succession.

For nine years in succession an experiment has been conducted with Joanette oats by selecting large, plump, well developed seeds; light-weighing and light-colored seeds; and also seeds from which the hull had been removed by the separator. The experiment was begun in the spring of 1893 by selecting seed from the general crop of the Joanette oats of the previous year. The selection made in each of the following years has been from the product of the selected seed of the previous year. The number of grains used on each plot was carefully counted, and an equal number was used of each selection in each of the years in which this experiment has been conducted.

As the selection for this experiment has been continuous, selecting the seed each year from the crop produced in the year previous, the average results are of but little value, but the final results are interesting, valuable, and quite suggestive. In the crop produced in 1901, it was found that the large plump seed produced 44.4 bushels; the light seed, 28.5 bushels; and the hulled seed, 37.0 bushels per acre.

In weight per measured bushel, the crop produced from the large plump seed weighed five pounds more than that produced from the light seed, and practically the same as that produced from the hulled seed. From the results here presented, it will be seen that the seed which was hulled by the separator produced fairly good results in yield of grain per acre and in weight per measured bushel. When it is considered that it is only a well-developed seed having a large kernel and a thin hull that will be hulled in the threshing, and that the hulling seems to cause but little injury to the germination of the seed, the good results from the hulled seed appear to be quite reasonable. The difference, however, between the large, plump, well-developed seed and the light-weighing and light-colored seed is very marked, and shows the great importance of sowing the former and discarding the latter.

Grain grown in Mixtures for the production of Grain and Straw.

In an extensive experiment conducted for six years in succession in growing oats, spring wheat, barley and peas, separately and in various combinations for the production of grain and straw, it was found that a mixture of barley and oats gave the highest yield of grain per acre. Having ascertained that a mixture of oats and barley was well adapted to a large production of grain, it became of importance to know the best proportions of these grains to use in the mixture to give the most satisfactory results. It was, therefore, decided in the spring of 1900 to conduct an experiment in sowing nine different proportions of oats and barley, in order to determine which mixture and which quantity of seed would give the best results in the production of grain and straw. The following gives the amount of oats and barley per acre used for seed in the different mixtures: 1. Oats, ½ bus. and barley, ½ bus. 2. Oats, ½ bus. and barley, 1 bus. 3. Oats, ½ bus. and barley, 1½ bus. 4. Oats, 1 bus. and barley, ½ bus. 5. Oats, 1 bus. and barley, 1 bus. 6. Oats, 1 bus and barley, 1½ bus. 7. Oats, 1½ bus. and barley, ½ bus. 8. Oats, 1½ bus. and barley, 1 bus. 9. Oats, 1½ bus. and barley, 1½ bus. This entire experiment was conducted in three places in our experimental grounds in 1900 and again in 1901. In the average of three experiments, it is found that the mixture of 1 bushel of oats and 1½ bushels of barley per acre produced the largest yield of grain in 1900, and the second largest yield of grain in 1901. In taking the average of the two years, the mixture here mentioned has produced the highest yield of grain. In yield of straw per acre, however, it is found that 1½ bushels of oats and 1 bushel of barley made the highest record. The lowest yield of grain per acre was produced from a mixture of 1½ bushels of oats and ½ bushel of barley per acre in each of the two years in which this experiment has been conducted.

In growing a mixture of oats and barley for the production of grain, it is important to select those varieties which require about the same length of time to reach maturity. If a standard variety of oats, such as the Banner or Siberian, is used, it is important to select some late variety of barley, such as the Chevalier two-rowed, in order that the two varieties may mature at the same time. If a standard variety of barley, such as the Mandscheuri or common six-rowed is used, it is then necessary to select some early varieties of oats, such as the Daubeney or Alaska. In each of the past two years, an experiment was conducted with three different mixtures which would reach maturity at different times. The following gives the varieties in each of the three mixtures: 1. Mandscheuri barley and Daubeney oats. 2. Siberian oats and Chevalier barley, and 3. Poland White oats and Kinna Kulla barley. The first two mixtures here named produced the largest yields of grain per acre in each of the past two years.

Comparative results from cultivating and Plowing Root, Potato, Rape and Corn Ground.

An experiment is in progress in which sections of land that had produced potatoes, fall turnips, Swede turnips, mangels, carrots, rape, and corn, were partly cultivated and partly plowed the following spring and afterwards sown with oats, spring wheat, barley, and peas. The plowing and cultivating for each separate test were done simultaneously. Those portions of land which were cultivated were stirred to a depth of from $2\frac{1}{2}$ to $3\frac{1}{2}$ inches, and those portions which were plowed were turned over to a depth of about 5 inches. The work was thoroughly done by both methods. The results show that in the case of peas, the yield of grain per acre was larger from the plowed land than from the cultivated land which followed each of the seven crops here mentioned In yield of wheat, oats, and barley per acre, however, the results are quite similar for the two methods, the cultivated land giving slightly the best results with wheat and the plowed land with oats and barley.

Methods of cultivation for Oats and Barley

In 1901 an experiment in soil cultivation was carried on with both oats and barleys In No 1 plot the land was cultivated to a depth of 6 inches, after which the grain was sown with a grain drill and the land was then rolled and harrowed. The treatment of No. 2 plot was similar to that of No. 1, with the exception that the land was cultivated to a depth of only 3 inches No. 3 plot was treated in the same way as No. 2 plot, with the single exception that the land was not harrowed after it was rolled. In No. 4 plot, nothing was done to the land after the grain was sown. This experiment was conducted in duplicate with both oats and barley, thus making in all sixteen plots. The results of this experiment for this year were somewhat irregular, and no definite conclusions can be drawn from the test. The experiment will likely be repeated for several years.

Varieties of Oats.

Our experiment station has spared no pains in conducting experiments with different varieties of oats, in order to ascertain the most suitable kinds for cultivation throughout the Province. Two hundred and twenty-eight varieties have been grown on uniform plots in our experimental grounds within the past fourteen years. The greater number of these have now been grown for five years in succession, and definite data have been obtained each year regarding the height of plants, the strength of straw, the susceptibility to rust, the yield of grain, the yield of straw, the weight per measured bushel, etc, of each variety. As there are about two and a half million acres of Ontario land devoted to the oat crop each year, we have felt justified in doing a large amount of work to find out the best varieties for the Province, and have, therefore, imported seed from a great many countries in different parts of the world, and both the foreign and Canadian varieties have been tested under uniform conditions. Of all the varieties which have been grown in the past, we have found that the White Siberian, the Oderbrucker, the Vick's American Banner, and the Bavarian to be among the very best for general cropping. All these varieties have given large yields of grain, which is of good quality. The straw of each variety grows to a good length and generally stands up well, the heads are spreading, the grain is white in color, and the hulls are comparatively thin. The Joan-

ette Black oats have produced a very large yield of grain; but as the straw is exceedingly short, they are only suitable for soil which naturally produces a very large amount of straw. When the Joanette oats are sown on rich land, they should be sown very thinly, as they stool abundantly, and if sown thickly are apt to be a failure. The Daubeney and the Alaska have proved to be two of the very earliest varieties of oats to ripen, and are suitable for those localities which require a very early oat, or for sowing in combination with six rowed barley.

Seed Oats from Different Latitudes.

Four years ago our experiment station sent seed oats of six varieties to the experiment station in the State of Missouri. Arrangements are made by which the Missouri station and our own can exchange seed yearly, with the object of studying the influence of environment on the production of oats for seed. In the spring of 1900, and again in the spring of 1901, we received from the Missouri Experiment Station southern-grown seed of the same varieties as we forwarded to Missouri two and three years previous. The six lots of Missouri seed were sown beside the six lots of Ontario seed in each of the two years, and the average results of the test show that, as a rule, the Missouri seed produced the largest yield of grain per acre, and that the Ontario seed produced oats which gave the heaviest weight per measured bushel. The intention is to repeat this experiment for several years until more conclusive results are obtained.

Varieties of Six-Rowed and Two-Rowed Barley.

Within the past fourteen years a large number of both six-rowed and two-rowed varieties of barley have been under experiment in our trial grounds The results show, that for general purposes, the six-rowed barleys have given much better results than the two-rowed varieties. Among the six-rowed barleys which have been grown for a number of years in succession, the Mandscheuri variety from Russia has given decidedly the best general satisfaction. It produces a good length of straw which usually stands up well, the yield of grain per acre is excellent, and the weight per measured bushel is nearly always about three pounds above the standard. In comparison with the common six-rowed barley of Ontario, we find that in the average results of these two varieties for the past thirteen years, the Mandscheuri has surpassed the Ontario variety by about nine bushels per acre. Some of the other varieties of six-rowed barley which have given the best results are the Oderbrucker, the Scotch Improved, and the Imperial Six-Rowed.

We have grown in the experimental grounds a greater number of two rowed barleys than we have of the six-rowed varieties. Of all the varieties under experiment, however, it has been found that in the average results for several years the best two-rowed barley has given about thirteen or fourteen bushels of grain per acre less than the best six-rowed variety. In cases where a late variety of barley is desired to grow in combination with a medium-ripening variety of oats, it is necessary to secure a barley that is slow in reaching maturity, and there appears to be no varieties so well adapted for this purpose as those belonging to the two-rowed class. Both for growing separately and for growing in combination with oats, the New Zealand Chevalier and the French Chevalier are among the very best varieties.

Varieties of Hulless Barley.

Within the past few years a great deal has been said and considerable has been written in Ontario regarding one or two varieties of Hulless barley. The grain of the Hulless barley usually weighs about sixty pounds per measured bushel, while the standard weight of the common varieties in Ontario is forty-eight pounds per measured bushel. The skin of the Hulless varieties is thin and transparent, and is white, purple, or black in color. The grain resembles wheat more than it resembles barley. The straw is apt to be weak, and when ripe becomes so brittle that the heads are frequently broken off. Some of the varieties possess heads with six rows, and others with two rows. Among the twelve varieties which we have grown for several years in succession, the Guy Mayle, Purple, and Black Hulless are the varieties which have given the largest yield of grain per acre. None of these varieties, however, have given nearly so many bushels per acre as the Mandscheuri variety of six-rowed barley. Perhaps the best known variety in Ontario

belonging to this class is the Black Hulless. This variety gives a good yield of grain which gives a heavy weight per measured bushel, but it usually possesses a very weak straw. The New White Hulless, regarding which so much has been said of late, possesses a stiffer straw than the Black Hulless variety, but is a much lighter yielder of grain.

Varieties of Spring Wheat.

Even though spring wheat is not grown in some sections of the Province, it must be remembered that in others it forms one of the regular crops of the rotation ; and in those sections where it is grown most largely it is important to secure those varieties which prove to be the most reliable for the average season. We have had about one hundred and forty varieties of spring wheat under experiment at the College within the past thirteen years. In the average results of the experiments for several years in succession, we have found that the "Wild Goose" has given decidedly the largest yield of grain per acre among all the varieties which we have grown. This variety produces very hard grain of coarse quality, which is difficult to grind. Both the flour and the bread made from Goose wheat, although of good quality, has a yellowish appearance. As it is a desirable variety, however, for the manufacture of macaroni, there has been a considerable demand in Italy and France for the Wild Goose wheat within the past five years. It is estimated that nearly 90 per cent. of the Wild Goose spring wheat which is shipped from Canada is used for the manufacture of macaroni. Our keenest competitors in the supply of macaroni wheat are Russia, India and Turkey, and the price for Ontario Wild Goose wheat will likely vary somewhat from year to year, owing to the production in the other countries. In order to keep up our reputation and to hold this good market for the Goose wheat, it is of the utmost importance that the variety be kept strictly pure. There is nothing that is likely to injure the export trade of the Goose wheat so much as the impurity of the sample. The grain should be kept free, not only from fall and spring wheat, but also from oats and barley. While it is important for the farmers to grow the Wild Goose wheat free from other varieties, it is of just as great importance that the exporters do not mix the soft wheats with the Wild Goose variety, even though the price of the Wild Goose wheat is a few cents higher per bushel than the softer wheats at the time when the wheat is being exported. Other varieties of macaroni wheats which we have grown are Medeah, Bart Tremenia, Sorentina, and Algiers. Each of these varieties has given better results than any of the finer varieties of spring wheat ; but none of them equals Wild Goose in yield of grain per acre. The Red Fife, Herison Bearded, Wellman Fife, and Red Fern are some of the best of the finer qualities of wheat according to the average results of several years' experiments.

Varieties of Winter Wheat.

Upwards of one hundred and sixty-five varieties of winter wheat have been grown at the College within the past fourteen years. These include the Canadian varieties and also those imported from Germany, Russia, France, England, Scotland, Australia and the United States. The results as to strength of straw, weight per measured bushel, and yield of grain per acre of a few varieties which are at present occupying the attention of many of the wheat-growing farmers of Ontario, are herewith presented.

	Per cent. of crop Lodged. Av. 6 yrs.	Lbs. per Bush. Av. 6 yrs.	Bushels per acre. (60 lbs.) Av. 6 yrs.
1. Dawson's Golden Chaff (white)	14.5	60.0	54.1
2. Imperial Amber	29.2	60.7	51.5
3. Egyptian Amber	32.5	61.2	50.1
4. Early Genesee Giant (white)	14.3	60.1	49.7
5. Buda Pesth (red)	60.0	61.1	49.6
6. Michigan Amber	28.3	60.9	49.3
7. Turkey Red	38.0	61.5	40.6
8. Treadwell (white)	10.8	60.6	39.1

Note.—The results in the foregoing table represent the work of six years in each case, with the exception of Buda Pesth, which has been tested for four years only.

In the autumn of 1900, exactly one hundred varieties of winter wheat were sown in our experimental grounds. In the spring of the present year, these were all examined to ascertain the comparative resistance of the different varieties to the attacks of the Hessian fly. The fly was found in twenty-four of the varieties, the greatest amount being found in the following kinds: Rudy, Mealy, Murray's Hybrid, Longberry No. 1, Genesee Reliable, Bearded Winter Fife, American Bronze, Wemide, Dawson's Golden Chaff, Geneva, and Pride of America. These were injured in the order here given, the Rudy variety being injured the most. The following varieties were practically free from the Hessian fly in the spring of the year: Imperial Amber, Egyptian Amber, Early Genesee Giant, Michigan Amber, etc. Even these varieties, however, showed slight injury later in the season. The Turkey Red wheat which was grown in Ontario for eight years showed but little injury from the fly, but the Turkey Red which was imported from Kansas in 1900 was considerably affected. For a more thorough study of this question several experiments with winter wheat are now in progress For fuller information on the Hessian fly, the reader is referred to a bulletin on this subject prepared within the past year by Prof. Lochhead. Copies of this bulletin can be obtained by applying to the Department of Agriculture, Toronto, Ontario.

The susceptibility to rust is somewhat different with the different varieties of winter wheat. In studying this point very carefully with each of forty varieties for five years in succession, it has been found that the following kinds contained the least amount of rust: Bissell, Geneva, Turkey Red, Emporium, Amherst Isle, Imperial Amber, Reliable, Arnold's Hybrid, Red May and McPherson; and that the following kinds contained the greatest amount of rust: American Bronze, Helena, Silver Star, Early Genesee Giant, Early Red Clawson, and Red Velvet Chaff. The American Bronze had fifty per cent. more rust than Dawson's Golden Chaff, and Dawson's Golden Chaff had fifty per cent. more rust than the Michigan Amber.

The average of several years' results from seeding at different dates shows that the grain which was sown on or before the 9th of September, gave a considerably larger yield of both straw and grain than that which was sown after that date. The very best yields were obtained from the wheat which was sown the first week in September.

In each of seven years, an experiment has been conducted in duplicate by sowing winter wheat broadcast and with a drill. The results from sowing the same quantities of seed by the two methods are very similar, the yields per acre being practically equal. It should be understood that, in every case, the land was in a good state of cultivation when the seeding took place. In addition to this, an experiment was started with sowing an equal quantity of seed with the seed drill, half of it being sown the one way on the plot, and the remaining half being sown cross-wise on the same plot. This method of sowing, known as "Cross-drilled," gave slightly better results this year than the common drilling; but as this is the first year the experiment has been conducted, the results will not be published until they have been confirmed by further tests.

In order to find out the influence of cutting wheat at different stages of maturity upon the quality of the grain for seed purposes, samples were taken from the crop cut at different dates, and these samples were carefully sown upon separate plots. In the average results of these tests made with two varieties in each of six years, it was found that the heaviest weight of grain per measured bushel, and the largest yield of grain and straw per acre, were produced from seed taken from the crop which had been allowed to become very ripe before it was cut.

Varieties of Rye.

Although rye is grown in Germany much more extensively than wheat, we find that in Ontario only about 140,000 acres are devoted to this crop annually. Five varieties of winter rye have been grown in our experimental grounds within the past ten years. Two of these varieties, however, were dropped from our experiments in 1895. In the average results for several years, we find that the Mammoth Winter Rye has given us the largest yield of grain per acre. Not only does this hold true in the average results for several years, but it also holds true in the experiments of 1901. The Mammoth Winter

rye surpassed the common rye in yield of grain per acre by five bushels in 1898, one and a half bushels in 1900, and fourteen bushels in 1901. In the average yield of straw, both the Mammoth Winter rye and the Common rye produced upwards of four tons per acre.

Four varieties of spring rye were grown in our experimental plots in 1901 with the following results in yield of grain per acre: Dakota Mammoth, 38 3 bus; Prolific Spring, 33.3 bus.; Common, 32 6 bus.; and Colorado Giant, 15.6 bushels. In the average yield of grain per acre for four years, these varieties gave the following results: Dakota Mammoth, 41.8 bus.; Prolific Spring, 37 6 bus; Common, 35.0 bus.; and Colorado Giant, 25 bushels. In the average yield of straw for the same period, all the varieties, except the one last named, produced practically two and a half tons per acre. It will thus be seen that winter rye produces larger yields of both grain and straw per acre than the spring varieties.

Varieties of Buckwheat.

Three varieties of buckwheat have been grown in the experimental grounds for six years in succession, and in the average results of those six years it is found that the Japanese has given 20 3 bushels; the Silver Hull, 16 bushels; and the Common Grey, 13.8 bushels of grain per acre. In the production of straw, it is also found that the Japanese is the heaviest yielder, producing an average of 3 tons, while the Silver Hull produced 2.8 tons, and the Common Grey, 2 6 tons per acre. In the results for 1901, the Japanese gave a little over 23 bushels of grain per acre, which was about 4½ bushels more than the Silver Hull, and 9 bushels per acre more than the Common Grey variety.

Varieties of Field Peas

The common field pea is a leguminous plant and a native of Italy. It has been in cultivation many hundred years and is chiefly grown for its grain. It is also used in mixing with oats for the production of green fodder or of hay. For soiling purposes, it produces a large yield of very nutritious food. The seed is exceptionally rich and is of great value for using with other grain in fattening cattle and hogs. The straw is used extensively as a food for sheep, and is sometimes mixed with other coarse fodder for feeding to dairy cows. Field peas can be satisfactorily used in Ontario, as the Cow peas are used in the Southern States for plowing under as a green manure.

Upwards of one hundred varieties of peas have been grown in our experimental grounds within the past thirteen years. The greater number of these have been tested for at least five years in succession, after which time the poorer varieties have been dropped and the more successful kinds have been retained in the experiment. Not only have these varieties been tested for their productiveness, but they have also been examined very carefully during each of the past four years in order to find out those varieties which were least injured by the pea weevil (*Bruchus pisi*), perhaps more commonly known as the pea bug. The adult beetle deposits its yellow eggs on the outside of the young pod of the pea plant early in the summer. These hatch in a few days and the larvae bore through the pods into the peas where they eat a considerable portion of the interior of the peas. They remain inside the grain until they are fully grown. They sometimes emerge from the peas in the autumn and sometimes not until spring. As the pea weevils are becoming very numerous throughout the southern part of Ontario, great injury is done to the pea crop, and some farmers are giving up growing the common varieties of peas on this account. The accompanying table gives the average yields per acre of twenty-six of the leading varieties of peas grown in the experimental department for seven years in succession, and also gives the average percentage of weevilly peas in the experiments for four years.

Results of testing 26 varieties of Field Peas.

Varieties. (Arranged according to their average yield of grain per acre for seven years.)	Average percentage of peas containing weevils. (4 years.)	Average weight per measured bushel. (7 years.)	Average yield per acre. (7 years.)	
			Straw. (Tons.)	Grain. (Bush. 60lb.)
1. White Wonder	56	60 4	1.2	38.2
2. New Zealand Field	59	58 5	1.3	37 0
3. Early Britain	64	57 8	1.4	36.5
4. Egyptian Mummy	39	62.5	1.6	35.3
5. New Zealand Brown	61	56.8	1 5	34 4
6. Tall White Marrowfat	62	59.6	1 6	34.7
7. Potter	61	59 5	1.5	33 4
8. New Zealand Blue	59	59.7	1.1	32 9
9. Prussian Blue	50	60.0	1.7	31 8
10. White-Eyed Marrowfat	56	60.4	1.5	31.2
11. Common Grey	56	56.5	1.5	30.7
12. D'Auvergne	58	59.1	1.3	31.3
13. Chancellor	60	58.5	1.3	30.5
14. New Canadian Beauty	58	60.3	1 4	30.5
15. White Imperial	53	59.3	1 4	30.2
16. Improved Grey	70	56 9	1.4	32.2
17. Crown	58	58.0	1.4	28.9
18. Canada Cluster	48	61.0	1.5	29.3
19. Black-Eyed Marrowfat	64	59.5	1.4	27.1
20. Sword	57	59.6	1.6	27.1
21. Golden Vine	54	59.8	1.4	27.1
22. Centennial White	53	60.4	1.5	26 9
23. Multiplier	49	60.5	1.8	26.0
24. Prince Albert	49	60.9	1.7	25.1
25. Striped Wisconsin Blue	49	61.2	1.8	25.0
26. Coffee	53	57.8	1.5	23.6

It will be seen from an examination of the results here presented that there is a difference of over fourteen bushels per acre in the average yield of the highest as compared with the lowest variety in grain production. The White Wonder, which stands at the head of the list in yield of grain, possesses a very short straw and is suitable only for land which is exceptionally rich The Early Britain, which comes third in the list in yield of grain per acre, possesses a much longer straw than that of the White Wonder. This variety has made the highest record in the co-operative experiments throughout Ontario during the four years in which it has been distributed. The peas of the Early Britain variety are brown in color and are, therefore, not so marketable a pea as some of the other varieties. In examining the column of figures representing the percentage of peas which were injured by the weevil, we find that only five varieties had less than 50 per cent. uninjured in the average results for four years. The Egyptian Mummy and the Canada Cluster were the freest in this respect. These two varieties are very similar in their habits of growth. It will be seen from the results here presented that all of these twenty-six varieties are liable to be greatly injured by the ravages of the pea weevil.

Weevil-Proof Peas.

None of the one hundred varieties of common peas which have been grown under experiment at the College have proven themselves to be proof against the ravages of the pea weevil (*Bruchus pisi*) so troublesome in the southern part of Ontario. There are other classes of peas, however, which differ considerably from the common varieties in their manner of growth and which have so far proven themselves to be weevil-proof. These are the Grass peas, Egyptian peas, and Cow peas.

Grass Peas The Grass pea produces straw of good length and of good quality, and the grain, which is angular in form, is very hard In the average results of tests made with the Grass peas at the College for a period of seven years, it is found that the annual yield of grain has been 25.7 bushels per acre, and the yield of straw 2.2 tons. The grain is exceptionally heavy, the average weight per measured bushel for four years being a

little over sixty-four pounds. The results of the Grass pea tests have been given in a number of our annual reports since 1889, and this pea is now being grown quite extensively in some parts of Ontario where the pea weevil is doing so much damage to the common varieties of peas.

Egyptian Peas. The Egyptian pea is a leguminous plant grown extensively in the Mediterranean regions and in Central Asia. It has many common names, such as Coffee pea, Chick pea, Idaho pea, etc., and is known to botanists by the scientific name of *Cicer arietinum*. It has been used as feed for cattle and also as an article of human food for upwards of three thousand years. The seed is somewhat larger than that of the common pea and is enclosed in a short, thick, hairy pod, there being from one to two peas in each pod. The plant itself is seldom used except as a soil renovator, but the yield of grain is large and is ground into meal, which makes a very valuable cattle food when fed in much the same way as cotton seed meal. As a human food, the peas are used in various ways. The ripened grain is sometimes prepared for the table in much the same way that we prepare our Canadian beans for culinary purposes. Egyptian peas are sometimes roasted and used as a substitute for coffee. We have had the Egyptian pea under experiment since the spring of 1893. The crops of 1897 and 1898, however, were injured, and the results for these years are of no value. The average results for seven years are as follows: Yield of grain per acre, 35.6 bushels; yield of straw per acre, one ton; and weight of grain per measured bushel, 62.1 pounds. The Egyptian pea is rather slow in reaching maturity, and as it is short in the vine it requires good strong soil in order to obtain a satisfactory crop. This variety seems to be very well adapted to soils which usually cause the ordinary varieties of peas to produce too much straw that is apt to mildew.

Cow Peas. Nearly all the varieties of Cow peas require such a long season of growth that they are suited only to the warm climate of the South. A few of the earlier kinds have been grown in the Northern States, and have been tested at our experiment station at Guelph. We have as yet, however, been unable to find any variety of Cow peas upon which we can depend for the production of ripened grain, as our season is short, and it is only in exceptional years that even the earliest varieties of Cow peas will mature in Ontario.

Varieties of Field Beans.

Twenty-nine varieties of field beans have been grown in the experimental grounds for five years in succession. Each of nine of these varieties produced an average of upwards of 20 bushels per acre. Those giving the largest average yields for the five years are the following: Day's Improved Leafless, 22.3 bus.; White Wonder, 23.0 bus.; Medium or Navy, 22 6 bus.; Burlingame Medium, 22.3 bus.; Pearce's Improved Tree, 22.2 bus.; Schofield Pea, 22.0 bus.; Snowflake, 21.1 bus.; and Boston Pea Bean, 20 8 bus. per acre. The small white field bean gave an average of 19 7 bushels, and the Marrowfat variety a little over 17 bushels per acre. The Large White Haricots, which are so popular in England, have given an average yield of only 13.4 bushels of grain per acre in the five years' experiments.

Soy, Soja, or Japanese Beans.

The Soy bean is a leguminous plant, being similar to clover, peas, and our common beans in this respect. The plants are upright in growth, branching considerably, and usually contain a very large number of pods. The varieties of Soy beans are numerous, but many are late in maturing and are best suited to the warmer climates. There are some of the varieties, however, which are much earlier in maturing and are better adapted to the colder climates. About twenty years ago, Prof. Georgeson, then connected with the Agricultural College in the State of Kansas, imported from Japan fifteen varieties of the Soy beans, with which he conducted practical experiments on the Experimental Station grounds and found that five of the varieties gave good results. These five varieties were imported from Kansas some ten years ago for growing in our experimental plots. The Early Yellow Soy Bean has given decidedly the best results among the five varieties which we obtained from Kansas. The record of this variety has been satisfactory throughout, and the yield of grain per acre in 1901 was 25.3 bushels. When we realize that this grain when ground furnished a meal about equal in composition to cotton seed meal, we cannot

help but acknowledge that this variety furnishes a large amount of valuable food constituents. It has given good results in the co-operative experiments throughout Ontario, as well as in the trials at the College.

Vetches for Seed.

The common vetches and the hairy vetches were both sown in 1900, and again in 1901, and allowed to ripen for seed. As the Hairy vetches have been doing so well as a fodder crop, and as the seed is very expensive, it is desirable to glean information regarding the possibilities of producing seed of the Hairy vetch in Ontario. Although the growing crop of both varieties was good in each of the two years, the seed production was not satisfactory from the spring sowings. The Hairy vetches ripened very unevenly. The yield of Hairy vetches was slightly better than that of the Common vetches in each of the two years. In the autumn of 1900, a plot of rich land which was in a somewhat sheltered place, was sown with the seed of Hairy vetches. The crop came through the winter well and produced upwards of 8 bushels of seed per acre in the summer of 1901. This is not a very large yield of seed, but when it is realized that the seed has been selling at from five to seven dollars per bushel, the returns would be great even from the amount of crop which was obtained.

Varieties of Flax.

Three varieties of flax have been grown in our experimental grounds for five years. The varieties under experiment have been the Manitoba, Russian, and the Common, and the results have been fairly uniform for the three varieties. In the spring of the present year, a small quantity of seed of the East India White variety of flax was obtained and sown in our plots. As the amount of seed was so small, we are unable to give any comparative results, but find this variety to be entirely distinct from the others and to be very early.

Varieties of Millet for Seed.

In each of the years 1894, 1898, 1899, 1900, and 1901, different varieties of millet were allowed to ripen to ascertain the comparative results of the different varieties in yield of seed per acre. The California variety of millet gave the largest yield of seed per acre in 1894, the second largest in 1898, the third largest in 1899, the second largest in 1900, and the fifth largest in 1901. Taking the average of the four years, the California variety gave 40.4 bushels per acre as compared with 36.4 bushels as the average yield of the Hungarian Grass. The Japanese Panicle millet, which has produced the largest yield of green fodder per acre of all the varieties of millet under experiment, gave 23.8 bushels of seed per acre in 1898, 31.3 bushels per acre in 1900, and 40.4 bushels per acre in 1901. In the average of five years' experiments, the common millet produced 21.1 bushels of seed per acre, which is only about one-half the yield of that produced by the most prolific variety.

Varieties of Corn for Grain.

In past years, the results of the dent, flint, and sweet varieties of corn have all been given together, and the results in total yield per acre, yield of ears per acre, comparative earliness of the different varieties, etc., have been presented in the report under one heading. In 1900, and again in 1901, after the ears were husked and weighed in the fall, those of the earlier varieties were taken to the experimental building and allowed to dry, after which they were shelled and the yield of grain of each variety ascertained. Of the twenty-eight varieties which were treated in this way in each of the two years, we find that the largest average yields of grain per acre were produced by the following varieties: Hathaway's Yellow Dent, Great Western, North Star Yellow Dent, King Phillip, Genesee Valley, Keil's Early Dent, Pride of Canada, Salzer's South Dakota, and Angel of Midnight. Each of the varieties here mentioned produced an average of over 60 bushels of shelled grain per acre.

Varieties of Sorghum for the Production of Seed.

Sugar Cane. The first experiment in which we attempted to ascertain the amount of seed which could be obtained from different varieties of sugar cane was conducted in our experimental grounds in 1900 and was repeated in 1901. In each year five varieties were used. The seed was planted about 27 inches apart each way, there being six seeds planted in each place. Only three plants, however, were allowed to remain in each hill after the growth had become nicely started. This method was adopted in order that a complete stand of plants might be secured. The land was kept on the level and was cultivated similarly to that producing a crop of corn. All varieties were allowed to remain as late as the season would permit before they were cut. As the seed of the sugar cane is produced at the top of the plants, the heads were removed, and after being allowed to dry were threshed. The Fodder Cane produced the largest yield of seed per acre in each of the two years, *i.e.*, 20.8 bushels in 1900 and 24.2 bushels in 1901, and the Early Minnesota Sugar Cane came second in each of the two years, with a yield of 19.9 in 1900 and of 15 7 in 1901. It will thus be seen that some of the varieties of sugar cane will produce a good deal of seed per acre in Ontario, provided the season is favorable.

Broom Corn. The information regarding date of seeding, method of cultivation, etc., which is given in the item on sugar cane will apply equally well to the broom corn. Four varieties in all were planted in the spring of 1900 and again in 1901. Taking the average for the two years, the Early Japanese Broom Corn produced the largest yield of seed, 30 8 bushels, and the Improved Evergreen variety came second with a yield of 29.5 bushels per acre. The Dwarf variety of broom corn gave an average of only 5 3 bushels per acre in 1900 and 7 3 bushels per acre in 1901. It will thus be seen that there is a great difference in the relative amount of seed produced by the different varieties of broom corn.

Other Sorghums. Besides the different varieties of sugar cane and broom corn, a number of other varieties of sorghum were grown under uniform conditions with varying results in seed production. In this class the Brown Dhoura corn gave the greatest yield of seed per acre in each of the two years, the yield in 1900 being 14 3 bushels and in 1901 17.2 bushels. A few of the varieties gave less than one bushel of seed per acre in each of the past two years.

Varieties of Sunflowers for Seed Production.

Three varieties of sunflowers have been grown in the experimental department and the yield of seed determined in each of four years. Taking 20 pounds as the standard weight of sunflower seed, we find the average yield of seed for the four years produced by the Mammoth Russian was 64 8 bushels, by the White Beauty 62.7 bushels and by the Black Giant 55.0 bushels. It will be seen that each of these varieties produced very large yields.

Varieties of Potatoes.

A great deal of attention has been devoted to testing potatoes at our Experiment Station within the past few years. Fully twenty-five distinct experiments have been carried on with different methods of preparing seed, different systems of cultivation, application of commercial fertilizers, etc. The results of many of these experiments have been given in my annual reports from year to year, to which the reader is referred. Besides the experiments here referred to, upwards of two hundred varieties of potatoes have been grown under uniform conditions in our experimental grounds within the past ten years. A number of these varieties which proved the least successful were dropped from our lists previous to the spring of the present year. In 1901, the number of varieties under experiment was one hundred and three. All the varieties were planted on the 23rd of May in rows 3⅓ links (26⅔ inches) apart. The cut potatoes were planted one foot apart in the rows, and only one piece was planted in each place. The seed was placed about four inches below the level of the soil, and level cultivation was carried on during the summer.

In the results for the past year, it was found that each of thirty varieties gave upwards of 300 bushels of potatoes per acre, and that each of six varieties gave a yield of less than 200 bushels per acre. The largest yields in 1901 were produced by the fol-

lowing varieties : Sunlit Star, American Wonder, the Daisy, Pearl of Savoy, and Rural Blush. The Empire State variety, which has made a high record in the average results for eight years, is not included in the five highest yielding varieties this year, but follows closely after with a yield of 327 bushels per acre. In taking the average results of a large number of varieties of potatoes grown for a series of years, it is found that the Empire State, Pearl of Savoy, American Wonder, Dempsey's Seedling, and Rural New Yorker No. 2 are among the best as general croppers. For exceedingly early use, the Stray Beauty, Howe's Premium, and Early Ohio have given the largest yields per acre at nine weeks after planting in the results for 1901, and also in the average results for six years. Although the Stray Beauty is an exceedingly early potato, it is not recommended for cultivation, except for very early use, as later in the season other varieties will surpass it in quality.

Selection of Seed Potatoes.

The results of several experiments conducted at the College within the past few years show that the size of the potatoes, or the size of the pieces planted, has a marked influence upon the crop produced. Large potatoes or large pieces produce greater yields than small potatoes or small pieces. It has been found that large potatoes cut into pieces of about 2 ounces in weight gave very satisfactory results, when the amount of seed used as well as the yield of potatoes produced were both taken into consideration.

Number of Potato Sets to Plant in Each Hill.

As the result of an experiment conducted for three years in succession, in planting one, two, and four pieces of potatoes in the same place, and by using the same weight of seed in every case, it has been found that larger yields and better satisfaction have been obtained where only one piece was planted in each place. The cutting of a potato tends to increase the number of stems produced, and when from two to four small potato sets are planted in one place there is a greater number of stems produced than when one large piece is used. A few, large, vigorous stems appear to give better results in both yield and quality of potatoes than a large number of small weakly stems.

Length of Time to Cut Potatoes Before Planting.

An experiment has been conducted for seven years in succession in cutting potatoes and planting them on the same day, as compared with cutting potatoes from four to five days previous to planting. It has been found that the potatoes which were cut and planted on the same day gave upwards of six bushels per acre per annum more than those which were cut and allowed to remain a few days before they were planted Both the experiments at the College and the co-operative experiments throughout Ontario demonstrate very clearly the great importance of planting potatoes immediately after they are cut.

Remedies for the Potato Beetle.

For six years in succession an experiment has been carried on in our trial grounds by treating potatoes differently for the destruction of the potato beetle. The treatments used were : Paris green with water, Paris green with plaster, and a preparation known as Potato-Bug Finish. These were used from two to four times in each season. As a basis of comparison one plot in every test was allowed to remain untreated. The average results of the experiments for the six years go to show that the potatoes which were not treated produced an annual yield of 76 bushels per acre ; those treated with Potato-Bug Finish, 120 bushels per acre ; with Paris green and plaster, 125 bushels per acre ; and Paris green in water, 135 bushels per acre. In four out of five years, the Paris green and water gave the best results, and in one year the Paris green and plaster gave the best satisfaction. In no instance did the potatoes which were treated with the Potato-Bug Finish give as large a yield of tubers per acre as those treated with the Paris green in olution.

Field Roots.

The root crop occupies an important place in a rotation, furnishes an excellent means for cleaning the land, prepares a splendid seed bed for a cereal crop, and supplies a large amount of succulent and palatable winter fodder, which is rich in food constituents and is easily digested by the animals. In many localities, however, the corn crop is taking the place of roots to a considerable extent as a stock food. This, of course, applies more to the southern part than to the northern part of the Province, owing to the fact that corn requires a much greater amount of heat and sunshine for its perfect development than does any one class of the root crops. For the benefit of those who grow roots as a stock food, we hereby submit very brief notes upon the results of experiments conducted at the College, both with varieties of roots, and with various methods of cultivation.

Varieties of Field Roots.

Several hundred varieties of roots have been grown in the Experimental Department within the past ten years, and the majority of them have now been under test for at least five years in succession. The following are some of the largest yielding varieties :—*Long Red Mangolds*—Evans' Improved Mammoth Sawlog, Simmers' Improved Mammoth Long Red, and Steele-Briggs' Long Red Selected ; *Intermediate Mangels*—Carter's Champion Yellow ; *Globe Mangels*—Carter's Warden Yellow ; *Swede Turnips*—Hartley's Bronze Top, Kangaroo, and Sutton's Magnum Bonum ; *Fall Turnips*—Cow Horn and Jersey Navet ; *Carrots*—Mammoth Intermediate Smooth, Improved Short White, and Improved Half Long White.

Selection of Root Seed.

An experiment has been conducted by sowing different selections of seed for five years in succession with mangels and carrots ; four years in succession with Swedish turnips ; and five years in succession with sugar beets and fall turnips. In each of these years, the large plump seed, medium sized seed, and small sized seed was taken from good average seed purchased from leading seedsmen. In selecting the seed, great care was taken to use nothing but what was apparently sound in every respect.

Selections.	Yield of roots per acre.					
	Mangels ; average, 5 years.	Carrots ; average, 5 years.	Sugar Beets ; average, 3 years.	Swede Turnips ; average, 4 years.	Fall Turnips ; average, 3 years.	Average yield per acre of all classes of roots.
Large plump seed	33.19	24.47	20.32	13.97	22.79	22.95
Medium sized seed	29.62	22.23	19.79	12.39	19.45	20.70
Small sized seed	21.52	16.23	14.45	5.66	11.97	13.97

The results here presented are the averages of the crops produced from the different selections. The results are certainly very interesting. There are but few growers of roots who ever think of sifting the seed or trying in any way to improve the seed purchased. As none but apparently perfectly sound seed was used for this experiment, the results indicate that much better returns could be obtained in ordinary farm practice by carefully separating the large from the small seed and discarding the latter. In the average results of all the classes of roots for the number of years during which the experiment has been conducted, it will be seen that the large plump seed gave fully 2 tons per acre more than the medium sized seed, and 9 tons per acre more than the small sized seed. The greatest comparative difference resulting from the selection of seed is shown by Swede turnips, and the least comparative difference by the sugar beets and mangels. We believe that a great mistake is sometimes made by root growers in trying to purchase seed at a low price without much regard to the size or quality of the seed.

Planting Root Seed at Different Depths.

For several years in succession, we have sown root seed at different depths in the soil, in order to ascertain the depth at which we might expect to obtain the best results throughout a series of years. The experiments have been conducted on comparatively low land, and also upon land of considerable elevation The soil has been what might be termed an average clay loam, and in no instance was it very light or very heavy. The experiment has been repeated for four years with mangels, sugar beets, and Swede turnips; for three years with carrots; and for two years with fall turnips The cultivation has been on the level throughout. The seed of each of the classes of roots in each of these years was planted one-half inch, one inch, one and a half inches, two inches, three inches, and four inches below the surface of the ground. The average results, up to the present time, show that mangels, sugar beets, Swede turnips, and carrots gave the best results from placing the seed at a depth of one-half inch, and fall turnips at a depth of one and a half inches. Taking the average of all the experiments made with the various classes of roots, we find that the seed which was planted only one-half inch deep gave the largest yield per acre, and as the depth of planting the seed increased, the yield per acre decreased. The mangel seed which was sown at the depth of one-half inch gave an average yield of 23.9 tons per acre, and that sown at the depth of one inch gave 16.3 tons per acre. The sugar beet seed, which was sown only one-half inch deep, gave about four tons per acre more than that which was sown to a depth of one inch. This experiment indicates, that on soil similar to that on which this experiment was conducted, root seed should be sown quite close to the surface, and more particularly is this important in the case of mangel and sugar beet seed.

Roots Grown on the Flat and on Ridges.

An experiment has been conducted for five years in succession with carrots, and for six years in succession with mangels, Swede turnips, and fall turnips in order to compare the results from sowing the seed on ridges, as has been the usual custom throughout Ontario, with the sowing the seed on the level. The experiment with each class of roots was conducted in duplicate each year, thus making a total of forty-six separate tests. The experiment was conducted in different portions of the experimental grounds, and upon land of different elevations. The soil was not specially heavy or specially light, but what might be termed an average clay loam. The ridges used were made to a height of about three inches. Taking the average of all the tests made with all the classes of roots, it is found that the land which was cultivated on the flat produced between four and five bushels per acre more than the land which was ridged before the roots were sown.

Thinning Plants of Field Roots at Different Stages of Growth.

For no less than five years, an experiment has been conducted with mangels, carrots, swede turnips, and fall turnips, by thinning the plants when they were only from $1\frac{1}{2}$ to 2 inches in height, and thinning the plants when they were from 8 to 10 inches in height. The experiment with each class of roots was conducted in duplicate each year. The average results of the mangels, Swede turnips, and fall turnips are decidedly in favor of the early thinning, while those of the carrots slightly favor the later thinning. In taking the average of all the results, we find that early thinning gave $1\frac{3}{4}$ tons of roots per acre more than the later thinning.

Varieties of Sugar Beets for Agricultural Purposes.

Owing to both the good feeding and the good keeping qualities of sugar beets, a number of Ontario farmers are now growing sugar beets as a stock food. From an agricultural standpoint, fully twenty varieties of sugar beets have been grown in the experimental grounds at the college. Seed has been obtained from different sources under eight different names, and has been sown in plots side by side for eight years in succession. A few of these varieties are very similar in appearance, while others are quite different in their characteristics. The following list gives the average number of tons per acre of the eight varieties of sugar beets grown in the experimental grounds for eight years :

Lane's Improved	18.8 tons	White French	16.1 tons
Red Top	18.8 "	Red Skinned	15.6 "
White Silesian	18 4 "	Kleinwanzlebener	15.4 "
Champion	18.1 "	Improved Imperial	13.4 "

For six years in succession, three other varieties have been grown under uniform conditions with those already mentioned. The average yield per acre for the six years of each of these varieties is as follows : New Danish Improved 19.9 tons ; Jersey, 18.2 tons ; and French Yellow, 16 9 tons.

In 1901 twenty-two varieties of sugar beets were grown in the experimental grounds for agricultural purposes. Besides the tests made with these varieties, several tests were made with the Kleinwanzlebener sugar beet, the seed of which was obtained from different sources, some of the seed being imported in the spring of 1901 and the rest in the spring of 1900. All these were tested on land which produced winter wheat in 1900. Soon after the winter wheat was removed from the field, the land was plowed to a depth of about three inches. Late in the autumn the land was plowed to a depth of fully six inches. In the spring of the present year, farm-yard manure at the rate of twenty tons per acre was applied to the land, and the subsoil was stirred to a depth of about ten inches by means of a grubber. On the 15th of May seed was sown in rows 3⅓ links (26 2-5 inches) apart. When the plants were from one and one-half to two inches in height they were thinned to one link (7.9 inches) apart. Level cultivation was used throughout.

The following table gives the results of the different varieties of sugar beets in connection with the experiments here outlined.

Varieties of Sugar Beets for Feeding Purposes.

Varieties.	Yield of Roots per Acre (tons).		
	1900.	1901.	Average Two Years.
1. Red Top	24.45	19.63	22.04
2. Red Skinned	21.55	20.60	21.08
3. White Silesian	21.45	18.15	19.80
4. New Danish Improved	19.10	18.60	18.85
5. Green Top White	18.35	18.91	18.63
6. Lane's Improved	20.45	16.28	18.37
7. Champion	19.25	17.18	18.22
8. Royal Giant	14.95	19.29	17.12
9. Giant Red Half-Sugar	14.50	17.67	16.09
10. White French	17.35	14.39	15.87
11. Giant White Half-Sugar	14.05	17.22	15.64
12. Pitzscheke's Elite	14.85	14.61	14.73
13. Jersey	13.70	14.63	14.17
14. French Yellow	13.15	15.14	14.15
15. Carter's Nursery	13.35	14.93	14.14
16. Improved Imperial	14.00	14.22	14.11
17. Imperial Grey Top	11.85	15.87	13.86
18. Queen of the Danes	11.65	12.63	12.14
19. Vilmorin's Improved*	12.55	9.73	11.14
20. Kleinwanzebener (seed from Wiarton, Ont., 1900)	.....	16.81	.....
21. Kleinwanzebener (seed from Caro, Mich, 1901)	....	14.59	.....
22. Kleinwanzebener (seed from Scranton, Pa., 1900	.....	14.24	.....
23. Kleinwanzebener (seed from Aylmer, Ont., 1900	.....	13.74	.....
24. Vilmorin's French Sugar	.....	13.22	.....
25. Mangel Sugar Beet	.....	13.01	.....

At our request, the Chemical Department analysed averaged samples of the different varieties of sugar beets grown in the Experimental Department in 1900, and also in

* The Vilmorin's Improved had only 80 per cent. of the required number of roots in the test of 1901.

1901. The results of the chemical analyses will be found in the report of the Chemical Department written by Prof. Harcourt in this volume. (See page 37.)

From the results here presented, it will be seen that the varieties of sugar beets specially noted for their high percentage of sugar, such as the Kleinwanzlebener, Vilmorin's Improved, and Pitzscheke's Elite, are not as large yielders as some of the varieties recognized for agricultural purposes. It must be understood, however, that some of the larger yielding varieties do not contain as much sugar as others which produce a smaller yield. The yields per acre here presented could be studied in conjunction with the chemical analyses, as presented in Prof. Harcourt's report in this volume.

In the average of two years' experiments, it is found that the following varieties produced roots which grew out of the ground on an average of from three to five inches, *i. e.*, Royal Giant, 5 ins. ; Giant White Half Sugar, 3 4-5 ins. ; Giant Red Half Sugar, 3 7-10 ins. ; Red Skinned, 3 3-5 ins. ; Lane's Improved, 3 1-10 ins. ; Red Top, 3 ins. ; and Champion, 3 ins. The roots of some of the varieties grew out of the ground less than one inch in the average of the crop in the two years past, *i. e.*, Kleinwanzlebener, 4-5 inch ; Pitzscheke's Elite, 4-5 inch ; Carter's Nursery, 9-10 inch ; and Improved Imperial, 19 20 of an inch. In nearly all cases, those varieties which grow with a considerable portion of their root out of the ground are the easiest to harvest, but those which grow under the ground are the richest in sugar.

Varieties of Fodder Corn.

One hundred and thirty-eight varieties of corn where grown in the experimental department in 1901. These varieties belong to the three general classes of corn, *i. e.*, flint, dent, and sweet. Of all the varieties which have been grown for several years in succession, we find that the Mammoth Cuban and the Mastadon Dent are varieties which give excellent satisfaction on the warm soils of Southern Ontario, where large varieties of corn can be grown successfully ; that the Wisconsin Earliest White Dent gives a good yield of total crop per acre which is of excellent quality, this variety producing the largest yield of ears per acre among sixty seven varieties grown for five years in succession, and is well suited to the central part of Ontario where the frosts are not too severe; that the three flint varieties, Salzer's North Dakota, Compton's Early and King Phillip, and one dent variety, North Star Yellow Dent, have given good results and are well suited for the central and southern part of Ontario.

Depth of Planting Corn.

For three years in succession, corn has been planted $\frac{1}{2}$ inch, 1 inch, 1 $\frac{1}{2}$ inches, 2 inches, 3 inches, and 4 inches deep. The planting took place each year in the latter part of May. The experiment was conducted in duplicate each season. The corn which was planted 2 inches deep gave the largest yields of total crop per acre in each of the years 1900 and 1901, and the second largest yield per acre in 1899. Taking the average of the three years experiments, the planting at a depth of 2 inches gave the highest yield of total crop per acre.

Different Mixtures of Peas and Oats for Green Fodder.

For five years in succession different varieties of peas and oats have been sown in mixtures for the production of green fodder. A very careful selection has been made, with the object of securing a crop that would come early in the season ; and another that would come somewhat later ; and another that would come still later. This experiment was conducted in duplicate in each of the five years. The seedings of the different mixtures all took place at the same time in each year, and the crops were harvested when in about the right stage of maturity to be used as green fodder, the peas being nearly full size and the oats in the milk condition. The average results for the five years of each mixture are as follows : *Early varieties*—Daubeney oats and Chancellor peas, 5.9 tons of green crop ; *Medium early varieties*—Siberian oats and Prussian Blue peas, 6.9 tons of green crop ; and *Late varieties*—Mammoth Cluster oats and Prince Albert peas, 6.1 tons of green crop per acre. In the average of the five years' experiments, the early varieties were cut 70 days after seeding, the medium early varieties 77 days after seeding,

and the late varieties 84 days after seeding took place. These six varieties were used in the experiment throughout, with the exception that for the late mixture Golden Giant oats and Oakshott peas were the varieties used in the early experiments, and the Mammoth Cluster oats and Prince Albert peas formed the mixture in the later experiments. As there is a period of exactly two weeks from the time the earlier varieties were ready to harvest until the later varieties reached the same condition, it will be seen that by using suitable mixtures the farmer can take his seed and mixtures into the field and sow two or three different mixtures at the same time, and thus increase the feeding period by two weeks, simply from the use of varieties which require periods of different lengths for the production of green fodder of the right quality. Taking all the experiments into consideration, we have found that a mixture of two bushels of Siberian oats and one bushel of Prussian Blue peas per acre makes an admirable seeding for the production of either green or dry fodder.

Varieties of Sorghum for Green Fodder.

There are a large number of varieties of sorghum which are quite distinct in many characteristics. Some are used principally for the production of syrup; others for furnishing material for the manufacture of brooms and whisks; others almost entirely for the production of food for culinary purposes, etc. All of the varieties, however, are more or less valuable as producers of food for farm animals. Both in the United States and Canada, a good deal has been said and much has been written of late regarding the value of sorghum as an economical plant for the production of valuable food to be used as a pasture, a green fodder, or a dry fodder crop, or for the production of silage. In 1900, and also in 1901, the seed of the principal kinds of sorghum was collected and sown in the trial grounds for experimental purposes in each of the two years. The seed was planted in squares by placing about 5 seeds in a place, and allowing 3⅓ links (26 2/5 inches) between the different plantings. When the sorghum was about five inches in height, some of the plants were removed, allowing three to remain in each place. The sorghum was cultivated in about the same way that corn is usually cultivated. All the varieties were cut in October before being injured by frost. The following list gives the yield of green crop per acre and the percentage of the whole crop, which is in the form of leaf, as determined from the average results of the experiments of 1900 and 1901:

	Varieties.	2 years. Per cent. Leaf to Stem.	2 years. Tons of Green Crop per acre.
1	Orange Sugar Cane	32.86	18.09
2	Early Minnesota Sugar Cane	15.29	16.38
3	White Kaffir Corn	36.09	14.59
4	Kansas Orange Sugar Cane	31.78	14 13
5	Black Rice Corn	38.39	13.67
6	Fodder Cane	20.79	13.26
7	Early Amber Sugar Cane	15.90	12.28
8	Red Kaffir Corn	40.75	11.94
9	Yellow Millo Maize	35.02	10.98
10	California Golden Broom Corn	27.94	10.78
11	White Millo Maize	41.16	8.57
12	Improved Evergreen Broom Corn	25.19	8.13
13	Brown Dhoura Corn	36.41	7.89
14	Early Japanese Broom Corn	22.58	7.32
15	Dwarf Broom Corn	41.74	6.42
16	Jerusalem Corn	35.14	3.49

It will be seen from the results here presented that the largest yields per acre were produced by two varieties of sugar corn, and the lowest yields per acre by three varieties of broom corn. The Early Amber Sugar Cane, which is one of the best known varieties, stands seventh in the list in average yield of green crop per acre, giving fully five tons per acre less than the variety known as Orange Sugar Cane. In looking over the column of the percentage of leaf to stem, it will be seen that there is a very great variation, as, for instance, the Early Amber Sugar Cane has a very small amount of leaf and a large amount of stem, while the Dwarf Broom corn, the White Millo Maize, and the Red Kaffir Corn have forty per cent, as great a yield of leaf as stem.

Seven varieties of sorghum have been under experiment in each of seven years, and the average yield of green crop per acre of each variety for the seven years is as follows ; Orange Sugar cane, 16.9 tons ; Fodder cane, 15 2 tons ; Early Amber Sugar Cane, 14 5 tons ; California Golden Broom Corn, 11 tons ; Kaffir Corn, 10 9 tons ; Yellow Millo Maize, 9 4 tons ; and Jerusalem Corn 5.8. tons. Some of these varieties are much earlier than others, frequently producing full heads with matured seed. The average yield of heads per acre of each variety for the seven years is as follows : California Broom Corn, 2 060 lbs. ; Jerusalem Corn, 1,400 lbs. ; Yellow Millo Maize, 1,240 lbs ; Early Amber Sugar Cane, 620 lbs. ; Fodder Cane, 520 lbs. ; Orange Sugar cane, 340 lbs. ; and Kaffir Corn, 280 lbs. The California Golden Broom Corn produced a large amount of heads of good quality.

Varieties of Kohl Rabi

Three varieties of Kohl Rabi have been grown in the Experimental Department for five years in succession This crop is sometimes grown for food for stock in some of the older countries. The root of the Kohl Rabi is somewhat like that of cabbage, while the leaves resemble the tops of swede turnips. The valuable part of the plant, however grows about three inches above the level of the ground in the form of a bulb. Kohl Rabi makes a very nice food for domestic use, and is prepared for culinary purposes in much the same way as swede turnips. The seed of Kohl Rabi resembles very closely that of the swede and fall turnips, and the crop is grown in much the same manner as that of turnips.

The following is the average yield in tons per acre of each of the three varieties of Kohl Rabi grown in the experimental grounds for five years : Early White Vienna, 19 3 ; Earliest Erfurt, 16.5 ; and Purple Vienna, 16.2. Besides the three varieties which have been grown for five years, two others have been grown in each of the past two years and have produced the following average yields per acre for the two years : Goliath Purple, 15.9 tons, and Carter's Model 11.2 tons. In the crop for 1900, the Early White Vienna, Goliath Purple, Purple Vienna, Earliest Erfurt, and Carter's Model gave 20.7, 20.1, 15.6, 16 0, and 13.5 tons per acre in the order here given. It will be seen from these results, that the Early White Vienna gave the largest yield per acre in 1901, and also in the average of five years.

Varieties of Rape.

There are several varieties of rape, such as the Dwarf Essex, Victoria, White Flowering, Umbrella, and German Summer. Of these varieties, the Dwarf Essex and the Victoria are the most extensively advertised. We have had these two varieties grown under similar conditions in each of seven years The average results for the seven years show that the Dwarf Essex variety has produced 22.4 tons, and the Victoria 20 6 tons per acre. This shows the Dwarf Essex variety to have given one and four-fifths tons per acre more than the Victoria rape. There is no other variety of rape which has given nearly so good satisfaction as the Dwarf Essex. The German Summer (bird-seed rape) should never be grown for agricultural purposes, as it seeds the same season as sown and is, therefore, a variety poor in feeding properties and difficult to eradicate. These points should be carefully observed, as serious trouble has sometimes resulted from sowing a large area of this variety.

Results from Sowing Different Selections of Rape Seed.

From good average samples of commercial rape seed, large, medium, and small sized seeds have been selected for experimental purposes in each of five years. The seed in every instance was first separated by means of sieves of different sizes. After the seed was separated in this way, it was carefully hand-picked, and none but good, sound seed was used in every case. In each of the years, large seed was sown in one plot, medium sized seed in another plot, and small seed in another, and this was repeated once, twice, or three times, usually the latter. For this experiment, the seed was sown quite thickly, and after the plants were about two inches in height they were carefully thinned with the object of leaving the same number of plants in each plot, the object being to ascertain the comparative value of seeds of different sizes for crop production. In each of the years, the large seed produced the largest crop, and the small seed the smallest crop, except in 1896 when the medium sized seed and the small seed gave equal results. Taking

the average of the experiments conducted in the five years, we find that the number of tons of green rape per acre produced from each of the selections of seed were as follows: Large seed, 17.4 ; medium sized seed, 15.0 ; small seed, 12.4. These results are certainly very suggestive.

Methods of Cultivation for Rape.

In six different years, an experiment has been conducted by sowing rape on land which had not been subsoiled as against sowing rape on land which had been previously subsoiled. The subsoiling was done in every case with an ordinary subsoil plow immediately before the rape was sown. The experiment was conducted in duplicate each year. The following are the average results for the six seasons: Land not subsoiled gave 15.81 tons of green rape per acre, and the land which was subsoiled gave an average of 15.77 tons of green rape per acre. This shows a difference of only 80 lbs. of rape per acre between the two methods, which plainly shows that on land on which this experiment was conducted there was no advantage from subsoiling the land immediately before the rape seed was sown. This experiment was conducted in different portions of the experimental grounds. The surface soil may be termed an average clay loam. The subsoil is naturally rather compact in the experimental grounds. Had this experiment been conducted on soil of a different character, or had the subsoiling been done the autumn before the time that the seed was sown, the results might have been somewhat different.

In each of nine years, an experiment has been carried on in the experimental grounds by sowing rape on the level or flat land, as compared with sowing rape on land which had previously been ridged with a double mould-board plow. The top of the ridges was about three inches higher than the bottom of the furrow between the ridges. The rows were 3½ links (26 2/5 inches) apart in both methods of cultivation. The average number of tons of green rape per acre produced from the level cultivation was 13.2 tons, and that produced from the ridged cultivation was 13.9 tons, or a difference of a little over two-thirds of a ton of green rape per acre in favor of sowing on ridges. The results in the case of rape, therefore, are somewhat different from those of roots, which have usually given larger yields per acre on flat as compared with ridged land.

Depth of Planting Rape Seed.

For experimental purposes, rape seed has been sown one-half inch, one inch, one and one-half inches, two inches, three inches, and four inches deep in each of the past four years, in order to glean some information regarding the practical results from sowing seed at different depths throughout a number of seasons. This experiment has been conducted in duplicate in each of the four years. Great care has been taken to place the seeds at the exact depths below the surface. The following are the average results for the four years in tons of green rape per acre: One-half inch, 24.3 ; one inch, 18 3 ; one and one-half inches, 17.8 ; two inches, 17.8 ; three inches, 10.9, and four inches, 2.8. The results of this experiment, so far as has been conducted, seem to indicate that rape seed should not be placed in the soil, even to a depth of one inch. In 1898, the yield from planting one inch deep was about one ton per acre greater than from the planting of one-half inch in depth, but in each of the other three years the results were decidedly in favor of the shallow planting. As seasons vary so greatly in the amount of rainfall, and as it is impossible to know before hand just the kind of a season to expect, the average results for a number of years will form the best general guide in determining the best depth to sow rape seed. This experiment will likely be repeated in future years.

Varieties of Vetches.

For five years in succession, the Common Spring Vetch (*Vicia sativa*) and the Hairy Vetch (*Vicia vellosa*) have been grown under similar conditions in the Experimental Department in order to ascertain the comparative results of these two varieties in the production of green fodder. The Common Spring Vetch is familiar to many of the farmers of Ontario, especially to the dairymen who have used it for sowing with oats for the production of green fodder to supplement pastures during the dry part of the summer, or for making into hay for winter fodder. Common Vetches have been tested over a large part of the American Continent, but seem to be best adapted to Canada and to the North-Eastern States. The Hairy Vetch is not so well known in Canada as the Common variety, as it was originally obtained from Western Asia and has not yet come into gen-

eral cultivation in this Province. A great drawback in connection with the Hairy Vetch in Ontario is the high price at which the seed is sold. It may be possible, however, to obtain seed of this variety at a much less cost in the near future. From a crop of Hairy Vetches sown in the autumn of 1900, we obtained seed this year at the rate of about eight bushels per acre. The price at which the seed of the Hairy Vetch has been selling within the past year is about $6.00 per bushel.

In the average results of growing the two varieties of vetches for five years in succession, we find that the Hairy Vetch has produced 10.1 tons, and the Common Vetch 5.6 tons of green crop per acre per annum. Not only has the Hairy Vetch far surpassed the Common Vetch in yield per acre at the College, but the record has been very similar in the co-operative experiments with these varieties throughout Ontario. The Hairy Vetch seems to be very useful for either the production of green fodder to be cut and fed or pastured or as a cover crop on land planted with fruit trees.

Leguminous Crops for Green Fodder.

In the spring of the present year a large number of varieties of Cow Peas, Vetches, Soy Beans, etc., were planted under similar conditions for the production of green fodder. The season was more favorable than usual for the growth of some of these crops, and the Cow Peas did exceptionally well. The accompanying list gives the average height and the number of tons of green crop produced by each variety in the experiment.

	Varieties.	Average height inches.	Tons of green crop per acre. 1901.
1	Hairy Vetches	19	15.05
2	Black Cow Peas	22	14.05
3	Crimson Clover	13	13.30
4	Wonderful Cow Peas	26	12.23
5	Whip-poor-Will Cow Peas	23	12.00
6	New Era Cow Peas	22	11.55
7	Common Vetches	..	11.55
8	Taylor Cow Peas	20	11.25
9	Extra Early Blackeye Cow Peas	21	10.70
10	Warren's Extra Early Cow Peas	23½	9.50
11	Medium Green Soy Beans	40	9.10
12	Horse Beans	28½	8.55
13	Early Yellow Soy Beans	30	8.30
14	Prussian Blue Peas	30	6.85
15	American Coffee Berry	30	6.40
16	Grass Peas	25	6.30
17	Velvet Peas	20	5.75
18	Extra Early Dwarf Soy Beans	20	3.85

In reference to the past results of the Cow Peas, I quote the following from my report of 1899:—"There are over one hundred named varieties of cow peas grown in the United States. Nearly all of these, however, require such a long season of growth that they are suited only to the warm climate of the South. A few of the earlier kinds have been grown in the Northern States, and have been tested at our Experimental Station at Guelph. One or more varieties have been sown in our experimental grounds during each of the past eight or nine years. It has been found, however, that nearly all varieties are too late for the climate of Ontario, unless it is in some instances for producing a green crop for plowing under. They seldom grow to a height of more than ten to twelve inches, although an average height of 25 inches was made by the Black-Eye variety of cow peas in 1899. The varieties which we have mostly grown are the Warren's Extra Early, Black-Eye, New Era and Whip-poor-Will. Of these varieties, the Whip-poor-will and the New Era proved to be the earliest. None of these varieties, however, have produced an average of more than about one and one-half tons of green crop per acre during each of the past two years. During the entire period in which we have had the cow peas under experiment, no grain has been produced until the present year, when the plants became sufficiently well matured to produce a crop of peas, which was, however, very light. The yield of the New Era was the largest, but it was

only a little over two bushels per acre. The Experiment Station will still be on the watch for some varieties of cow peas which will be sufficiently rapid in growth to prove of value for cultivation in Ontario We are at present unable to recommend any of the varieties which we have grown as being suitable for our Northern climate.

Some of the varieties here mentioned have been grown under experiment in each of the past six years, and the results show the following annual yields of green crop per acre of each variety :—Yellow Soy Beans, 8 1 tons ; Crimson Clover, 7.6 tons ; Grass Peas, 7.3 tons ; Prussian Blue Peas, 6 tons, and Horse Beans, 5 4 tons.

Varieties of Millet for Green Fodder and for Hay.

Millet is grown extensively in Siberia, India, Japan, and China where the seed is used largely as a human food. It is estimated that the seed of millet, in one form or another, is used as a portion of the food of fully one third of the inhabitants of the globe. In Ontario, however, its chief use is for the production of green fodder or hay. Some farmers grow millet more or less extensively as a regular crop, but, as a rule, it is sown to supplement some other crop which, from some cause or other, has proven a partial failure. It is found that in some seasons the amount of rainfall is so abundant during the latter part of May and the early part of June, that it is impossible to get the corn planted in good condition ; in which case the land can frequently be used to good advantage in growing millet, as it does not require to be sown until comparatively late in the season. In this way, the loss of the corn crop would not be felt so seriously as it would have been had not a fodder crop been secured from the land. It will, therefore, be readily seen that the millet crop is frequently an important one for the farmers of Ontario, as it can be used so readily when other fodder crops are apt to be deficient.

Upwards of thirty varieties of millet have been grown under experiment at the College for the purpose of gaining information as to the most suitable kind for cultivation in this Province. Fourteen varieties have been under experiment in each of seven consecutive years, and the average results, therefore, are very valuable in showing the comparative values of these different varieties. As the fourteen different kinds of millet here referred to belong to four distinct classes, the results are presented for the varieties included in the various classes separately :

	Tons of hay per acre, average seven years.
1. Broom Corn Millets. (*Panicum miliaceum*).	
Japanese Panicle	4.84
White French	2.70
Red French	2.31
2. Foxtail Millets. (*Choetechola Italica*).	
Holy Terror Gold Mine	5.11
Golden Wonder	4.83
*Japanese Common	4.72
Magic	4.37
German or Golden	4.09
Hungarian Grass	3.64
Sa'zer's Dakota	3.73
Common	3.66
California	3.12
3. Barnyard Millets. (*Panicum crus-çalli*).	
Japanese Barnyard	4.44
4. Pearl Millets. (*Pennisetum typhoideum*).	
East India Pearl	5.31

Although the East India Pearl variety has given the largest yield of hay per acre still it is an exceedingly late and leafy millet which resembles sorghum in many ways and which never matures in Ontario. The Holy Terror Gold Mine variety belongs t

*Average for six years only.

the same class as the Hungarian Grass and Common Millet, but is a very vigorous grower and a much heavier producer than either of the more common varieties. The Japanese Panicle Millet, which has given an average of 4.8 tons of hay per acre in our experimental grounds at the College, has also made a very high record in the co-operative experiments throughout Ontario, surpassing the Hungarian Grass 33 per cent. in the experiments of last year.

Varieties of Grasses.

Experiments have been conducted within the past few years with the object of gleaning definite information regarding the comparative yields of hay per acre produced by the different varieties of grasses. My report for 1900 gives the average yield of hay produced by each of eighteen varieties of grasses, which were cropped in each of six different years. We are now directing our attention more particularly to the comparative characteristics of these grasses for the purpose of pasture. In order to glean information along this line, each variety of grass was cut in 1901 on the 9th of May. Four other cuttings followed with intervals of three weeks between each two cuttings, and a sixth cutting was made nine weeks after the crops were cut for the fifth time. The growth of the grasses being much slower in the autumn of the year, a greater period was allowed between the cuttings. This line of investigation is furnishing us with some excellent information regarding the different varieties when the growth of each is removed from the plots frequently. Some of the varieties furnish comparatively heavy crops early in the season and give only light cuttings in the autumn, while other varieties are somewhat later in the spring in making a rapid growth, but furnish satisfactory crops later in the season. The Tall Oat Grass, Virginia Lyme Grass, Yellow Oat Grass, Orchard Grass, Timothy, and Western Rye Grass gave the heaviest cuttings on May 9th in the order herein mentioned, the Tall Oat Grass producing the heaviest yield. At the last cutting in the autumn, the largest amount of grass was produced by the Orchard Grass, Kentucky Blue Grass, Perennial Rye Grass, and Yellow Oat Grass, in the order named. Taking the season as a whole, the greatest amount of grass for the six cuttings was produced by the Tall Oat Grass, Orchard Grass, Virginia Lyme Grass, and the Western Rye Grass, and the smallest amount by the Creeping Bent, Rhode Island Bent, Meadow Foxtail, and Red Top. This experiment will likely be continued along similar lines in future years when fuller information of greater value can be furnished.

Varieties of Clovers.

As with the grasses, different varieties of clovers have been grown under experiment for several years, and the results have been published in the annual reports from time to time. Special attention is now being given to the study of some of the varieties as producers of crops which can be pastured on the land. Lucerne, Common Red Clover, Mammoth Red Clover and Alsike Clover were sown in our experimental grounds in the spring of 1900, and winter rye was sown in the autumn of the same year. On the 9th of May, 1901, the crop on each plot was cut, weighed, and removed from the land. After the clovers were cut for the first time, they were allowed to grow for a period of three weeks when they were again cut, weighed, and removed. This was repeated at equal intervals until the fifth cutting was made, which was twelve weeks later than the time of the first cutting. Even a sixth cutting was made in the autumn, but a period of nine weeks was allowed between the fifth and the sixth cuttings, as the growth of the clovers was slow during the latter part of the season. Unfortunately the crop of Lucerne was cut in the autumn at the wrong time, and the material was not weighed. In examining the results of this experiment, it is found that the five cuttings gave the following total yield of green clover per acre: Lucerne, 13.4 tons. Common Red Clover, 11.9 tons; Mammoth Red Clover, 10.8 tons; Alsike Clover, 10.2 tons; and Winter Rye, 5.0 tons. These figures represent the amounts of pasture material which would likely be furnished by each kind of crop during the greater part of the summer. The Winter Rye produced only a small crop at the fourth cutting and nothing whatever at the fifth cutting. It is quite probable that the Winter Rye would make a higher record than this in some seasons. The greatest yield of green crop per acre was produced by the Lucerne at the first cutting, by the Mammoth Red Clover at the second cutting, by the Alsike Clover at the third cutting, by the Lucerne at the fourth cutting, and by the Common Red Clover at the fifth cutting. Although Lucerne produced the largest amount of green material per acre in the five

cuttings, still it is seen from examination of the results, that the growth of the Common Red Clover was the most uniform throughout the entire season, there being no cutting which gave less than one ton of green crop per acre as the result of three weeks' growth. It should be remembered in connection with this experiment, that Lucerne does not get its full growth until the third year after seeding.

Mixtures of Grasses and Clovers for Hay.

In the spring of 1897, twenty-one mixtures of grasses and clovers were sown with a grain crop. Crops were taken from the twenty-one plots in 1898 and in 1899. An experiment similar to this was again started in 1898 by sowing similar mixtures on twenty-one other plots. These plots produced two crops in 1899 and also in 1900, and a few of them produced three crops the second year. In the spring of 1900 the experiment was repeated for the third time, but, owing to incomplete germination of some of the varieties, no results from that seeding are given. In the spring of 1901, however, a complete set of twenty-one plots were sown in duplicate, making in all forty-two plots for the experiment sown in the spring of the past year. There were four grasses and four clovers used in this experiment. The grasses were : Timothy, Meadow Fescue, Tall Oat Grass, and Orchard Grass ; and the clovers were : Common Red, Mammoth Red, Alsike, and Lucerne. Each mixture was made up of either one grass and one clover, two grasses and two clovers, or four grasses and four clovers.

As this experiment has already been conducted in fall at two different periods, the average results are becoming valuable. We find, from a study of the crops produced from the various mixtures, that the Tall Oat Grass and Lucerne gave an average of 3.2 tons of hay ; the Tall Oat Grass, Orchard Grass, Mammoth Red Clover, and Lucerne gave an average of 3.1 tons of hay ; and the Timothy and Lucerne gave an average of 3.1 tons of hay per acre ; thus each of these gave upwards of 3 tons of cured hay per acre per annum. Nearly all of the others gave a yield of between 2 and 3 tons per acre, except some of the mixtures containing Orchard Grass, which gave slightly below 2 tons per acre. The Orchard Grass was considerably killed during the second winter. It will be observed that Lucerne was one of the varieties in each of the three mixtures which gave the largest yields of hay per acre. In the average results of the first year's crop after seeding, the Tall Oat Grass and the Mammoth Red Clover gave the largest yield of hay per acre at the first cutting, the yield being 3 tons ; and the Orchard Grass and Lucerne gave the largest yield of hay per acre at the second cutting, viz , 1 ton. In the average results of the second year's crop after seeding, the Timothy and Lucerne gave the largest yield of hay (2.4 tons) per acre at the first cutting ; and the Tall Oat Grass and Lucerne gave the largest yield of hay (.5 tons) per acre at the second cutting. The only mixtures from which there was a third cutting in the one season were those mixtures in which Lucerne was used. The mixture which gave the largest yield of hay in the third cutting was composed of Tall Oat Grass and Lucerne.

Grasses and Clovers Sown in the Fall and in the Spring Both With and Without a Nurse Crop.

Fully five million acres of land are used annually in Ontario for growing grasses and clovers. About one-half of this area is used for pasture purposes, and the other half for the production of hay. A large portion of the pasture results from the sowing of clover and grass seed, principally common red clover and timothy. A large area of the pasture land, however, has never been plowed and, therefore, produces those grasses and clovers which are principally native to Ontario. These natural grass lands produce pasture of fairly good quality, which is, however, usually quite limited in amount, except in special instances. The greater amount of hay grown in Ontario is that produced from either timothy or common red clover, sown separately or in combination. In some sections however, a considerable amount of Alsike clover is being used. As we realize the great area devoted to the pasture and hay crops in Ontario, it seems rather strange that so little has been done with the object of trying to get more definite information regarding the methods of sowing, the dates of sowing, the varieties of grasses and clovers, etc., which are likely to give the best results throughout a series of years. It was in consideration of these points that an experiment was started in our experimental grounds in the autumn of 1896 and the spring of 1897, which was continued until the autumn of 1898,

and which was started for the second time in the autumn of 1899 and the spring of 1900 and was completed at the end of the present year. This experiment, therefore, has been carried out with great care during two separate periods under quite similar conditions, with the exceptions of those brought about by the climatic changes of the different seasons. As the conditions of seasons vary so much from year to year, it is important to have these experiments repeated several times in order to obtain average results which are as reliable as possible, and which form a fairly accurate guide to those most interested.

Three prominent varieties of grasses and three prominent varieties of clovers were sown in the autumn of the year with winter wheat and without winter wheat, and in the spring of the year with oats and without oats. The same quantities of seeds were used for the different seedings of each kind of clover and of each kind of grass. The crops produced during each of the first and second summers after seeding took place, were cut and weighed first, as green crop, and, second, as a hay crop. In order to be very accurate in regard to the production of hay, three weighings were always made of each crop before it was removed from the plot.

The tabulated results here given represent the average yield of hay in tons per acre for each grass sown under each of the conditions of the experiment. The figures in every case represent the average of two distinct experiments.

Results of different sowings of Grasses and Clovers.

Crops.	Tons of Hay per Acre.			
	Autumn Showing.		Spring Showing.	
	Winter Wheat.	No Nurse Crop.	Oats.	No Nurse Crop.
Orchard Grass	3.49	4.20	4.44	3.73
Meadow Fescue	2.12	2.86	3.66	3.64
Timothy	2.94	3.44	3.27	4.28
Common Red	3.07	1.09	3.61	4.18
Alsike Clover	2.66	.91	2.47	2.79
Lucerne	3.65	1.42	4.03	4.17
Average 3 Grasses	2.85	3.50	3.79	3.89
Average 3 Clovers	3.13	1.14	3.37	3.71

It will be seen that the figures given in the tabulated form represent the yields per acre for only the second summer after seeding. In the first experiment, the Orchard Grass, the Meadow Fescue, and the Timothy, which were sown in the autumn with a grain crop, produced hay in the following summer as follows: Orchard Grass, 3 tons per acre; Meadow Fescue, 4.6 tons per acre; and Timothy, 4.6 tons per acre. In the second experiment, these same three grasses, which were sown in the autumn without winter wheat, also produced hay the following year, the yields being as follows: Orchard Grass, 1 ton per acre; Meadow Fescue, 1.1 tons per acre; and Timothy 2.1 tons per acre. Each of the grasses and the clovers sown in the first experiment without a grain crop in the spring of the year, produced the following yields of hay per acre in the first summer after the seed was sown as follows: Orchard Grass, 2.2 tons; Meadow Fescue, 3.2 tons; Timothy, 1.7 tons; Common Red Clover, 1.9 tons; Alsike Clover, 2 1 tons; and Lucerne, 1.5 tons. These were the only crops which were of sufficient quantity to cut and weigh in the first summer after sowing.

It will be seen from the figures given in the table here presented that the amount of hay produced from sowing the clover in the autumn of the year without any grain crop is very small. In the first experiment, the clovers which were sown alone in the autumn made a good growth before the winter started, but were completely killed before spring. Although the clovers, which were sown alone in the autumn in the second experiment, did not fare as badly as those of the first experiment, still the results were poor in comparison with those of other seedings. Both the grasses and clovers gave good results when sown in the spring, either with or without a grain crop. The grasses also gave fairly good results when sown in the autumn, either alone or with winter wheat. Timothy gave rather better results when sown in the spring with oats, than when sown in the autumn with winter

wheat, but in both seasons it gave a larger yield per acre when sown alone than when sown with a grain crop. The Orchard Grass gave much better results when sown in the spring with a nurse crop, than when sown in the spring without any other crop. In studying these figures, it must be remembered that where the grass and clover seed has been sown with either winter wheat or with oats, there is a great advantage in having the grain crop, which is likely to be more valuable in most instances than the increase in the yield of the grasses or the clovers when sown by themselves.

Mixtures of Hardy Grasses and Clovers for the Production of Either Hay or Pasture.

A large amount of experimental work has been done in testing varieties of grasses and clovers, both singly and in combination, within the past twenty-five years. The grasses and clovers have been carefully studied, and much information has been gleaned in regard to their value for hay and also for pasture. In 1885, Prof. Wm. Brown, who was then Farm Superintendent at the Ontario Agricultural College, recommended a mixture which he thought well adapted for permanent pasture. Only the most hardy varieties which had been tested up to that time were included in the mixture. In 1893, after eight years additional experimental work, during which time the writer was closely connected with the work of the Experimental Department, another mixture was recommended containing a smaller number of varieties and requiring a smaller amount of seed per acre. The grasses and clovers recommended in 1893 have proven themselves to be a valuable mixture. They are all hardy varieties, and when grown together give a large yield. An experiment was started in the spring of 1894 by sowing plots of the mixture which was recommended in 1885, and plots of the mixture which was recommended in 1893. The seed was sown with a light seeding of barley; and the germination of the seed of the grasses and clovers was quite satisfactory.

Mixture recommended in	Grasses and clovers.	Varieties in mixtures.	Amount of seed per acre.	Average height of 1st cutting	Yield of hay per acre.	
				Average for seven years.	1901, three cuttings.	Average seven years, 1895-6-7-8-9, 1900, 1901,—17 cuttings.
			lbs.	inches.	tons.	tons.
1885	Grasses	Meadow Fescue	6	31.4	4.16	4.60
	"	Meadow Foxtail	3			
	"	English Rye	2			
	"	Timothy	3			
	"	Canadian Blue	4			
	"	Orchard	3			
	"	Red Top	2			
	"	Yellow Oat	2			
	Clovers	Lucerne	4			
	"	White	2			
	"	Alsike	2			
	"	Red	1			
	"	Yellow	1			
		Total amount of seed used.	35			
1893	Grasses	Orchard	4	35.6	4.60	5.34
	"	Meadow Fescue	4			
	"	Tall Oat	3			
	"	Timothy	2			
	"	Meadow Foxtail	2			
	Clovers	Lucerne	5			
	"	Alsike	2			
	"	White or Dutch	1			
	"	Yellow or Trefoil	1			
		Total amount of seed used.	24			

Two cuttings were made from each plot in 1895, and from two to three cuttings have been secured in each of the years since that date. In 1901, which is the eighth year since the plots were sown, no less than three cuttings were taken from each plot. The total yield of hay produced from the three cuttings was 4.6 tons from the mixture recommended in 1893, and 4.2 tons from the mixture recommended in 1885. The figures presented in this report show the comparative yields of hay from the two mixtures. They also show that the grasses used for the mixtures are very suitable for the Ontario climate. These mixtures can be used for the production of either hay or pasture. Without a single exception, the mixture which was recommended in 1893 has produced a larger yield per acre than that which was recommended in 1885. We have named all the varieties of grasses and clovers sown in each mixture, and also the quantity of seed per acre, particularly for two reasons :—In the first place, that this experiment might thus be as clear as possible, and in the second place, that any person wishing to know the quantity of seed per acre of the different varieties which were recommended as a permanent pasture mixture could find the information in good form. It will be observed that the mixture recommended in 1893 possesses none but very hardy grasses, which have been tested at the College more or less for fully twenty years. This mixture could, of course, be somewhat modified to suit different localities and different soils.

Annual Crops for Pasture.

But little has been done in testing our annual crops for the purpose of pasturing. In order to find out which annual crops are likely to give the best results when pastured, an interesting experiment was started in the spring of 1900, and has now been conducted for two years in succession. For this purpose we tested eighteen different crops and three different mixtures. In each of the two years the crops were sown in three separate sets, there being twenty-one plots in each set, thus making in all a total of sixty-three plots. All of the plots were sown on the same day and under similar conditions in each year. The separate crops included in this experiment were as follows : (1) oats, (2) barley, (3) spring wheat, (4) buckwheat, (5) spring rye, (6) millet, (7) corn, (8) sugar cane, (9) kaffir corn, (10) common red clover, (11) crimson clover, (12) common vetches, (13) hairy vetches, (14) field peas, (15) grass peas, (16) cow peas, (17) yellow soy beans, and (18) rape. The mixtures which were used were combinations of some of the crops given in the foregoing list and were made up as follows : (1) oats and peas, (2) oats and common vetches, and (3) oats and hairy vetches.

The main object of the experiment was to find out the relative value of the different crops in producing the greatest amount of the most valuable material for pasture both early in the season and throughout the summer. The seed was all sown on the 5th of May, in 1900, and on the 6th of May, in 1901. The three sets were handled in each of the years as follows :

Set 1. The crops on all the plots in Set 1 were cut at the end of six, nine, twelve, fifteen, and eighteen weeks after the seed was sown, thus making five cuttings for each crop. Each cutting was weighed in the green state, and also after it was dried in the form of hay.

Set 2. Each crop was cut when it was considered to contain the greatest bulk of the best quality for feeding as green fodder. In order to ascertain the aftergrowth, another cutting was also made on each plot later in the season.

Set 3. A hurdle fence was placed around the set of twenty-one plots and cattle were turned on the plots daily until the pasture was all eaten. The first pasturing took place in the latter part of June and in the early part of July. Careful notes were taken of the amount of crop eaten from each crop on each day. After the crops were pastured the first time, they were allowed to remain undisturbed until the autumn, when the cattle were again turned in and the second growth was eaten off

The importance of this experiment will be realized when it is considered that, through various causes, the timothy and clover pastures in many sections of Ontario frequently fail to produce even a moderate amount of pasture for live stock. The germination of the seed is sometimes poor, the young plants are occasionally killed by the hot, dry weather of summer, or by the sudden changes of the weather in the winter and in the early

spring, and thus the foundation for a good pasture is destroyed in the early stages of its existence. When failures of this kind occur, the farmer is often at a loss to know what to do to supplement his pasture in the best possible way. A considerable amount of work has already been done in testing different crops for cutting in the green condition for feeding to animals when required in the summer season. Some work has also been done in feeding corn silage in the summer months when the pastures supply an insufficient amount of food material. Although a good many enquiries have been made regarding the comparative value of different annual crops for pasture purposes, it is difficult to give the desired information owing to the lack of definite experimental work along this line. We hope that the experiment now under consideration will gradually throw more light upon this question, and furnish information which will be of much service to farmers who wish to supplement their ordinary pasture lands by sowing spring crops to be used for pasture purposes the same season.

The table here presented gives the average results for the two years in yield of green crop per acre produced by each variety and by each mixture on the five dates of cutting, as determined in Set 1. It also gives the total amount of green material produced from the five cuttings of each crop.

Yields of green pasture per acre.

Crops.	Tons of green pasture crop per acre at each cutting. Average two years.					Total number of tons per acre in five cuttings.
	1st cutting, 6 weeks after seeding.	2d cutting, 9 weeks after seeding.	3rd cutting, 12 weeks after seeding.	4th cutting, 15 weeks after seeding.	5th cutting, 18 weeks after seeding.	
1. Hairy Vetches	1.2	4.0	1.6	1.9	.5	9.0
2. Sugar Cane	.1	2.3	2.4	1.1	.7	6.6
3. Grass Peas	1.9	2.6	1.0	.3	.1	5.8
4. Oats	2.5	2.4	.6	.3	.1	5.8
5. Common Vetches	1.5	2.3	.7	.7	.4	5.5
6. Corn	.5	3.2	1.1	.7	.0	5.4
7. Spring Rye	4.6	.7	.2	.0	.0	5.4
8. Millet	.7	2.5	.8	1.1	.3	5.3
9. Rape	.1	2.9	.8	.8	.7	5.2
10. Crimson Clover	.0	2.3	.6	1.0	1.1	4.9
11. Buckwheat	3.5	.2	.8	.0	.0	4.4
12. Kaffir Corn	.0	2.3	.6	.8	.6	4.3
13. Common Red Clover	.0	1.4	.8	1.0	1.0	4.2
14. Field Peas	2.2	1.5	.4	.0	.0	4.1
15. Barley	2.6	1.2	.3	.0	.0	4.0
16. Yellow Soy Beans	.5	1.8	.8	.5	.4	3.9
17. Cow Peas	.1	2.7	.4	.3	.1	3.5
18. Spring Wheat	1.8	1.0	.3	.0	.0	3.0
Mixtures.						
1. Oats and Hairy Vetches	2.4	2.7	1.5	1 6	.8	8.8
2. Oats and Common Vetches	3.0	2.5	.9	.7	.3	7.3
3. Oats and Peas	2.8	2.5	.8	.4	.1	6.6

NOTE.—The germination of the seed of all the crops was good, with the exception of the Kaffir Corn, Cow Peas, and Sorghum, which was rather poor, and the Rape and Crimson Clover, which was only fair.

The table is very suggestive as well as interesting. It will be seen that the largest yields of green material per acre were produced by the spring rye, buckwheat, barley and oats on the first date of cutting; the hairy vetches, corn, rape and cow peas on the second date of cutting; the sugar cane, hairy vetches, corn and grass peas on the third date of cutting; the hairy vetches, sugar cane, millet, crimson clover and common red clover on the fourth date of cutting; and the crimson clover, common red clover, sugar cane, rape and hairy vetches on the last date of cutting. Taking the total amount produced by the five cuttings, it will be observed that the hairy vetches and the sugar cane or sorghum produced the largest amount, and the spring wheat the smallest amount of green crop per acre, the hairy vetches having produced three times as great a yield as the spring wheat.

The barley, spring wheat, buckwheat, spring rye and field peas all gave fairly good crops at the first cutting, but they made practically no growth after the third crop was taken from the land. An important feature in connection with this experiment is the fact that the hairy vetches, the millet and the sugar cane gave such uniformly good results throughout the entire season, and would, therefore, be likely to stand grazing better than most of the other crops in the experiment.

In the second set, in which case the crops were allowed to grow until they reached that stage to produce the largest amount of green fodder of good quality, it was found that the greatest yields were produced by the hairy vetches, oats and peas, field peas and grass peas in 1900, and by corn, rape, yellow soy beans, hairy vetches, and common red clover in 1901. In no case did the second crop in No. 2 set reach one ton of green material per acre in 1900, but in the past year the crimson clover produced 5.3 tons, and the common red clover 3.5 tons of green crop per acre at the time of the second cutting. Taking the average results of the distinct varieties for the two years, it was found that the greatest yield of green crop per acre was produced by the hairy vetches, 9.9 tons, and the second greatest yield by the corn, 9.6 tons. It was also observed that the mixture of oats and hairy vetches gave an average of 8.8 tons, the mixture of oats and peas 8.2 tons, and the mixture of oats and common vetches 7.8 tons of green crop per acre.

In the third set, where the different crops were pastured, it was found that the spring wheat, corn, oats, barley, millet, rape, kaffir corn and sugar cane were eaten the most readily by the animals. With the exception of buckwheat and spring rye, all the crops, however, appeared to be relished fairly well by the animals. As the rye is a very rapid grower, it was found that even six weeks after the time of seeding the rye crop was perhaps a little too far advanced to be relished by the animals as much as it would have been had it been pastured a week previous.

The results of this experiment up to the present time, seem to show the advantage of growing a mixture of annual crops rather than growing the crops separately for pasture purposes. The results indicate that the following combinations should prove serviceable for the production of pasture of good quality throughout the season, viz.: 1. Spring wheat, grass peas and common red clover; 2. Spring rye, millet and hairy vetches; 3. Oats, sorghum and hairy vetches, etc.

Conclusion.

We have tried to be accurate in every detail of our work, and hope that the record of the results presented may prove of real service to the farmers of Ontario.

I wish to thank both yourself and the Minister of Agriculture for the kindly support given me in the work of the Experimental Department, and for the leave of absence granted me to visit Europe and to study European agriculture.

Respectfully submitted,

C. A. ZAVITZ,
Experimentalist.

PART XII.

REPORT OF MANAGER OF POULTRY DEPARTMENT.

To the President of the Ontario Agricultural College:

SIR,—I have the honor of presenting herewith the report of the Poultry Department for the year 1901. A larger amount of experimental work than usual has been carried on this year, especially along the line of fattening chickens, and now that we have on the premises a separate house for this work, a far larger number of experiments can be conducted.

The correspondence is steadily increasing and it is gratifying to find many farmers and others taking much more interest than formerly in commercial poultry; and I have no doubt whatever that they will continue to take more interest along these lines, as we have now at our door practically an unlimited market at good paying prices for the first grade of dressed poultry. I regret to say, however, that there is far too much poultry placed on the market in a poor condition, both as to dressing and as regards the color of the flesh and the plumpness of the body. We also notice a large number of the lighter breeds of poultry offered for sale, such as Leghorns. These are all right in their place, but not profitable for fattening purposes.

I regret very much that there are still many complaints from our large egg dealers about the high percentage of bad eggs received by them during the warm summer months, especially in July and August. This is to a large extent due to the indifference among those keeping poultry for egg production, about removing the male bird from the flock after the breeding season. A case came under my observation this summer in which six eggs out of eight had developed more or less growth of the embryo. These eggs looked nice and fresh, and certainly had not been sat upon by the hens; and it was only when held to the candle that the badness could be detected. Had these partially hatched eggs not been removed they would have been rotten in a short time. It seems to be generally forgotten that less than 90 degrees of heat will start an egg to hatch, and with this temperature as a hatching point what must a case of eggs be like that has travelled for several hours in the hot sun on a summer day? When the eggs are not fertilized there is no germ to develop and no decomposition takes place.

The usual instruction has been given to the first and second year students, also to the Farm Dairy Class.

The new poultry school now in the course of construction will give many poultrymen, farmers and others an opportunity to see and learn how to handle fowls to advantage. The lectures to be given by a few of our most successful poultrymen will be worth many times the cost of the course to the student; and I wish to add just here that the course, as outlined, will be as useful to the poultryman of some years experience as to the nov ce.

EGG PRODUCTON.

Eggs were produced in fair numbers during the winter. The Plymouth Rocks, Wyandottes, and Langshans laid much more freely than did the lighter birds, such as Leghorns, Minorcas, and Andalusians. The birds came through the winter in good condition; in fact, I never had so few sick birds during the spring of the year. By using the method of feeding as outlined in last year's report, we had no over-fat hens and thus avoided much trouble from liver disease, etc. We made use of the trap-nests as much as possible during the year; but owing to our not having a plan of the nest early in the season, we have records dating only from the first of April. By using these nests we can easily weed out the poor layers. I must say, however, that a large amount of time is spent in releasing the laying hens and in keeping the individual egg-records; but the labor is a source of profit to the breeder of utility birds and especially to the fancy poultry breeder, as with these nests he can furnish a pedigree of each chicken. With them we have discovered that one of our Barred Rock hens is rather an exceptional egg producer, having laid 49 eggs in 49 consecutive days and 151 eggs from April 1st to Nov. 1st. This hen offers to set, but is easily broken and starts laying again very readily.

Cost of Producing Summer Eggs.

During the past year a number of enquiries were received, asking for information as to the exact cost of producing a dozen of eggs during the summer months. With this object in view we selected two pens of hens, one of Barred Plymouth Rocks and the other of Andalusians. Each pen consisted of 12 hens and a male bird. By selecting these two breeds, it was thought we would get fair average results, as the Rocks are considered only moderate summer layers and good winter layers, whereas the opposite might be said of the Andalusians.

Each flock had a pen in the poultry house, 12 feet by 14 feet, and a sodded yard attached, 80 feet deep and the same width of the pen. From this it will be seen that the hens were supplied with all their food, with the exception of the grass in the yards. In the cost of production, as outlined below, no account is taken of labor, and no credit is given for the manure.

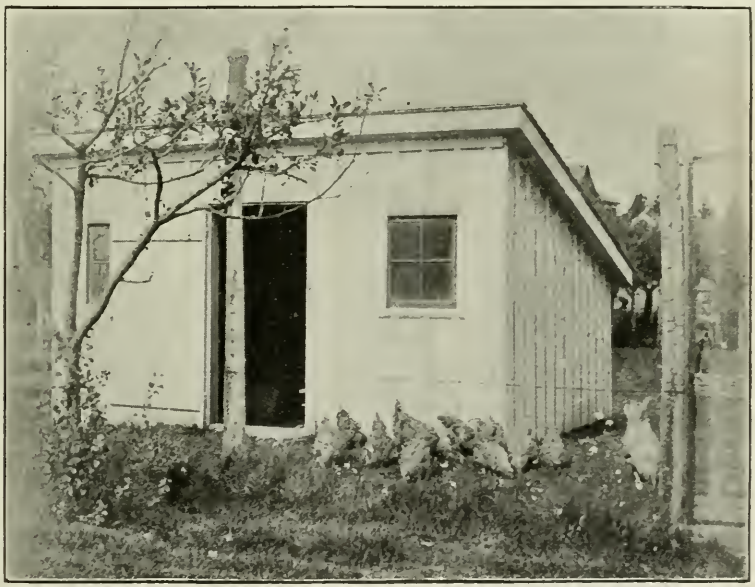


Fig. 1.—Colony House, of which there are four now in use.

Each 10 x 14 ft ; height at front, 7 ft., at back, 4½ ft. For summer use, but well and strongly built.

The hens were usually fed four times a day—whole grain in the litter or straw, in the morning ; meat or bone at noon, three or four times per week ; other days no noon feed was given. Mash at four in the afternoon, composed of equal parts of bran, shorts, and ground oats, moistened with skim milk; just before dark, a little whole grain. During the first month, cracked wheat and pin-head oatmeal were used for the morning feed, for the reason that at that season of the year we want excessive excercise in order to reduce the large amount of fat that is generally found upon hens that have been forced for winter laying. These very small grains, when scattered in deep straw, require considerable work to get them out, and thus we avoid apoplexy, which is quite common, especially among Rock hens, during the spring.

Fig. 2.—Brooder House.
140 x 14 ft., 7 ft. high at eaves.

Fig. 3.—Breeding Pen House.
108 x 15 ft., 6 ft. 6 inches to eaves, with open runs in front ; plum trees for shade.

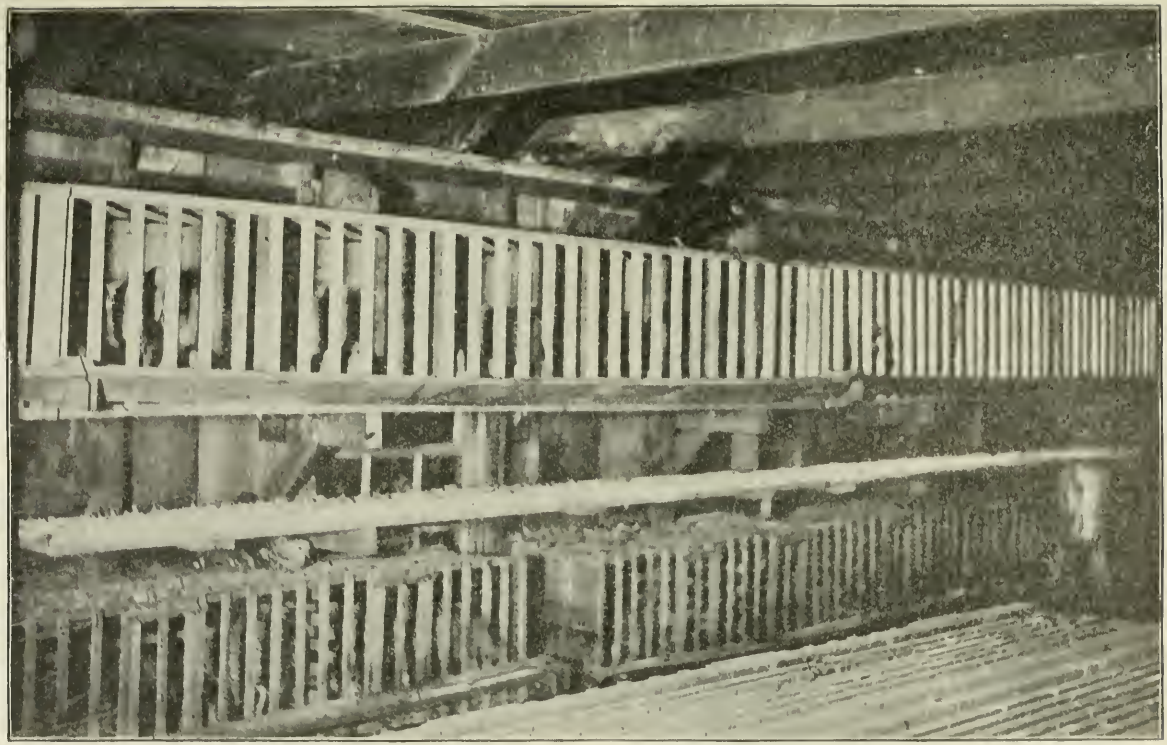


Fig. 4. Partial view of Inside of Fattening House.

Showing arrangement of pens. Pens at sides two tiers high. In centre, one row, of which top is seen in foreground. Two or three loose chickens act as scavengers and pick up food scratched out of troughs on to floor.

April 22nd to May 22nd. Rocks—13 hens, 1 cock:

Mixed feed—17.687 lbs., at $1.33 per cwt	23 576 cents.
Bone—12.687 lbs., at $1.00 per cwt	16.687 "
Mash—32 375 lbs, at 90c. per cwt	29.137 "
Wheat—21 875 lbs., at $1.13 per cwt	27 79 "
Milk—32 lbs., at 15c. per cwt	3.33 "
Total	100.52 "

Eggs laid, 16 dozen; cost per dozen, 6.28 cents.
Nearly all Rocks were broody during last week.

April 22nd to May 22nd. Andalusians—13 hens, 1 cock:

Mixed cracked grain—14.3 lbs., at $1.33 per cwt	25.99 cents.
Green bone—13 75 lbs., at $1.00 per cwt	13.75 "
Mash—35 lbs., at 90c. per cwt	31.05 "
Wheat—24 lbs., at $1.33 per cwt., or 68c. per bushel	27.19 "
Milk—35 lbs., at 10c. per cwt	3.5 "
Total	101.48 "

Eggs laid, 20½ dozen; cost per dozen, 4.9 cents.

May 22nd to June 22nd. Barred Rocks:

Oats—2 lbs 8 ozs., at $1.00 per cwt	2 8 cents.
Bone 2 lbs., at $1.00 per cwt	11. "
Mash—40 lbs., at 90c. per cwt	36. "
Milk—40 lbs, at 10c. per cwt	4. "
Wheat—34 lbs. 13 ozs., at $1.13 per cwt	39 58 "
Total	93.38 "

Eggs laid, 13 dozen and 10 eggs; cost per dozen, 6.82 cents.

May 22nd to June 22nd. Andalusians:

Milk—40 lbs., at 10c. per cwt	4. cents.
Oats—3 lbs., at $1.00 per cwt	3. "
Wheat—35 lbs. 7 ozs., at $1.13 per cwt	40.15 "
Mash—40 lbs., at 90c. per cwt	36. "
Bone—11 lbs. 6 ozs., at $1.00 per cwt	11.37 "
Total	94.52 "

Eggs laid 18 dozen and 2; cost per dozen, 5.21 cents.

June 22nd to July 22nd. Barred Rocks:

Wheat—26.375 lbs., at $1.13 per cwt	29.80 cents.
Oats—6.25 lbs., at $1.00 per cwt	6 25 "
Mash—41.75 lbs., at 90c. per cwt	37 57 "
Milk—41 lbs, at 10c per cwt	4.1 "
Bone—1 lb., at $1.00 per cwt	1.00 "
Total cost	78.72 "

Eggs laid, 13 dozen and 10; cost per dozen, 5.69 cents.

June 22nd to July 22nd. Andalusians:

Wheat—35.625 lbs. at $1.13 per cwt	40.25 cents.
Oats—6.25 lbs., at $1.00 per cwt	6 5 "
Mash—40 lbs., at 90c. per cwt	36.00 "
Milk—40 lbs., at 10c. per cwt	4.00 "
Bone—1 lb., at $1.00 per cwt	1.00 "
Total cost	87 75 "

Eggs laid, 16 dozen and 1; cost per dozen, 5.42 cents.

July 22nd to August 22nd. Barred Rocks:

Wheat—32.625 lbs., at $1.13 per cwt	37 99 cents.
Oats—9 lbs., at $1.00 per cwt	9.00 "
Mash—39.5 lbs., at 90c. per cwt	35 55 "
Milk—40 lbs., at 10c. per cwt	4.00 "
Bone—12 lb., at $1.00 per cwt	2.00 "
Total cost	88.54 "

Eggs laid, 14 dozen and 1; cost per dozen, 6.28 cents.

July 22nd to August 22nd. Andalusians:

Wheat—27.25 lbs., at $1.13 per cwt	30 79 cents.
Oats—14 875 lbs., at $1.00 per cwt	14.875 "
Mash—40 5 lbs., at 90c. per cwt	36.45 "
Milk—40 lbs., at 10c. per cwt	4.00 "
Bone—3 lbs., at 1.00 per cwt	3.00 "
Total cost	89.115 "

Eggs laid, 14 dozen and 9; cost per dozen, 5 cents.
Average cost per dozen for Rocks, 6.32 cents per dozen.
Average cost per dozen for Andalusians, 5.38 cents per dozen.

Hatching Season.

Generally speaking, this was not a good year ; in fact, this has been so for the past two or three seasons, both in Canada and in the United States. It is a problem that is

Fig. 5.—Light Brahma Hen.
Note massiveness. An all-round good specimen.

Fig. 6.—A Blocky White Wyandotte Pullet.
Note full breast.

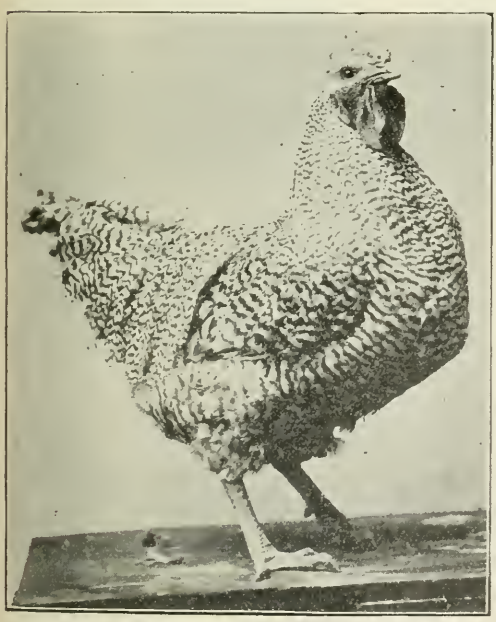


Fig. 7.—Barred Plymouth Rock Cock.
A favorite as a sire of utility birds, especially for fattening purposes. Note grand depth and breadth of body.

Fig. 8.—A Barred Plymouth Rock Hen of extra quality.
Good in shape, well barred, and handles well.

baffling our very best poultrymen ; and we are as yet, to a large extent, in the dark as to the cause or causes of the lack of fertility in the eggs, and, furthermore, as to the weak vitality of many of those that are fertilized.

We had fair hatches from January eggs, about 50 per cent.; but February and March eggs were practically useless. Not only was this so here, but it was the same at every poultry farm I visited, and caused general complaint from nearly everywhere. This, in a large measure, accounts for the numbers of immature birds exhibited at our fall shows this season. We hope to be able to carry on experiments along these lines this winter, with a view of getting some more definite information upon the subject. I am of

Fig. 9.—Plymouth Rock Pullet. (Daughter of Fig. 8).

Fig. 10.—Andalusian Cock with his Son and Daughter. (See Figs. 11 and 12).

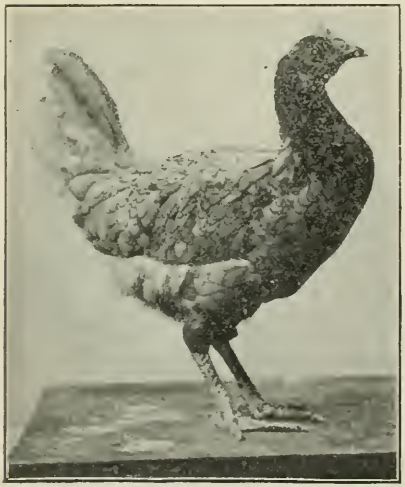


Fig. 11.—Andalusian Pullet. (Daughter of Fig. 10).

Fig. 12.—Andalusian Cockerel. (Son of Fig. 10).

the opinion that our houses, as at present, are too close and stuffy, there being a lack of good pure air. It is very difficult to arrange ventilation by means of doors and windows, without making the house very cold at certain periods of the day. Judging from observations of the past two winters, I would favour the mating of not more than six to eight hens with a male during the winter, and suggest that the male be not in the pen more than about three hours a day, after which time he should be moved to a separate coop

by himself and be well fed. It is also a question of some doubt in my mind as to whether we are not feeding far too much soft mash-food. This food is a great help in producing eggs in quantity; but where fertile eggs are wanted, it would be better to do with a smaller number and have them well fertilized I may be wholly wrong in these suppositions; but the foregoing is my opinion at present,—largely the result of the observations and experiences of the past few winters.

Natural and Artificial Incubating and Brooding.

The incubators hatched as well as the hens. The early chicks were raised in the brooders; but it was found more convenient to rear some of the later hatched ones with hens. The difficulty in rearing late hatched chickens in brooders during warm weather—late May or June—is that there is a great variation of temperature between day and night, thus making it exceedingly difficult to prevent the brooder from becoming too hot during the day or too cold at night. When the late hatched chicks are put out with

Fig. 13.—A Noted Layer.
Laid, from April 12th. to Nov. 20th, 167 eggs. Laid 49 eggs in 49 consecutive days.

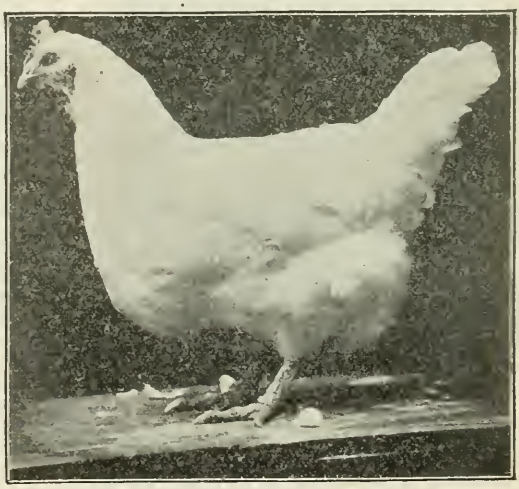


Fig. 14.—White Plymouth Rock Hen.
See breast shape and good length of body.

hens, this difficulty is solved; and, furthermore, the chicks get a greater variety of food in the way of insects than they would get if they were in the brooders.

Ducks.

We raised about 100 ducks this season. The accompanying cut shows the relative sizes of the Pekin, Indian Runner and Rouen grade ducks at ten weeks of age, the Pekin dressing 5½ lbs, the Rouen grade 4½ lbs and the Indian Runner 4 lbs. From this it will be seen that the Pekin is much the fastest meat producer. The Rouen is as large when mature, but is a rather slow grower, while the Indian Runner is a small duck at any age. They are, however, wonderful layers.

An experiment was conducted in forcing young ducks from the seventh to tenth week by feeding them with the cramming machine. Only one trial was made; but from this it appears that a duck will eat as much of its own free will as we were able to give it by the machine. The results might be very different with older ducks.

Experiments in Fattening Chickens.

Since the first of September we have fattened nearly 1,000 chickens. Experiments have been conducted with different grain rations, also some grain and root rations, and

further with chickens of different weights or ages as well as different methods of cooping. Many of these experiments are still in progress, and it is impossible at this date (December 3rd) to give more than a small amount of the results, but it is expected that the results of these experiments and others will be given in full in bulletin form early in the next year.

Fig. 15.—Barred Plymouth Rock, and two of his get. (See Figs. 16 and 17).

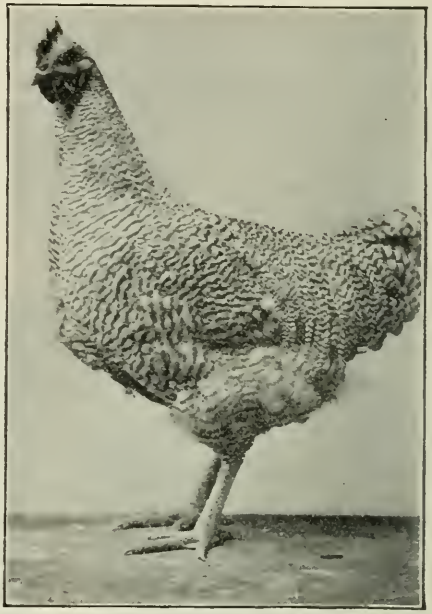


Fig. 16.—Barred Plymouth Rock. (Son of Fig. 15.)

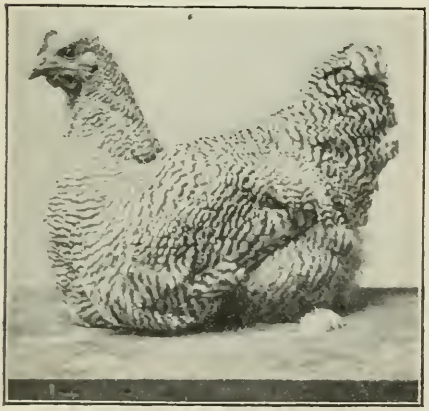


Fig. 17.—Barred Plymouth Rock. (Daughter of Fig. 15).

Fig. 18.—Minorca Hen. (Mother of Figs. 19 and 20).

The majority of the chickens fed have been Plymouth Rocks and Wyandottes and their crosses. We find these two breeds of chickens do well and make very economical gains. Some experimental work has been done in connection as to which is the better breed, but the results so far would indicate that they are very nearly equal.

Grain Rations.

The following table shows the amount of feed consumed by the different groups of chickens, the cost of producing a pound of gain, and the number of pounds of grain it took to make one pound of gain:

—	No. of trials.	Weight when put in crates.	After two weeks' feeding.	Gain.	Grain consumed.	No. of pounds of grain to make 1 lb. gain.	Milk consumed.	Cost of pound of gain.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	cts.
Group I — Cornmeal, 5 parts; Shorts, 4 parts; Pearl oat dust, 1 part; Animal meal, 1 part. Cost per cwt., $1.10	First trial....	43	55	12	35	2.916	35	3.5
	Second "	48.5	59.5	11	39	3.54	39	4.263
	Third "	49.5	61	11.5	38	3.3	38	3.974
	Average....	47	58.5	11.5	37.38	3.252	37.33	3.912
Group II. — Cornmeal, 2 parts; Ground buckwheat, 2 parts; Pearl oat dust, 1 part. Cost per cwt., $1.22	First trial*...	.....	.....	.....	.....	.....	.....	.....
	Second "	48.5	65	16.5	42	2.54	42	3.363
	Third "	48	63	15	40.5	2.7	41	3.56
	Average....	48.25	64	15.75	41.25	2.62	41.5	3.461
Group III.— Cornmeal, 4 parts; Ground buckwheat, 2 parts; Pearl oat dust, 2 parts. Cost per cwt. $1.22½	First trial....	45	53	8	35	4.375	35	5.797
	Second "	47.5	63	15	41	2.66	41	3.63
	Third "	50	62	12	40	3.3	40	4.416
	Average ...	47.5	59.33	11.66	38.66	3.445	38.66	4.614
Group IV.— Cornmeal, 2 parts; Pearl oat dust, 1 part. Cost per cwt, $1.23	First trial....	48	53.5	5 5	34.5	6.27	35	8.34
	Second "	48	60	12	38	3.18	38	4.22
	Third "	48	58.5	10.5	37	3.52	37	4.686
	Average....	48	57.33	9.33	36.5	4.32	36.66	5.748
Group V.— Pearl oat dust—cost per cwt., $1.50	First trial....	48	60	12	34	2.83	34	4.83
	Second "	49	63	14	40	2.85	40	4 57
	Third "	47.5	60	12.5	40	3.2	40	5.12
	Average....	48.166	61	12 83	38	2.96	38	4 84

*This food was not used in the first trial.

The following prices were paid for grain: Corn meal, $1.10 per cwt.; ground buckwheat, $1.20 per cwt.; middlings or shorts, 90c. per cwt.; animal meal, $1.60 per cwt. There were 12 birds in each trial of each group. The last 10 days of the feeding the birds were fed from the cramming machine, one and one-half pounds of milk being used to one pound of grain.

Conclusion.

Ration No. 1 is a good economical producer, but is objectionable, because it has a tendency to produce yellow flesh, which is undesirable in our best market.

Ration No. 2 is, perhaps, the most palatable of any, and it is one that makes a nice white flesh at a moderate cost.

Ration No. 3 is much the same as No. 2, except that it contains more corn-meal, which tends to make it less adapted for use during warm weather. Note the results of the first trial. It has a slight tendency towards producing a creamy flesh.

Ration No. 4 is the most unsatisfactory of all. The excess of corn in it decreases its palatability, and also makes it unsuitable for feeding during warm weather.

Ration No. 5 is a good one, when the oats can be purchased at moderate prices. I am of the opinion that rations Nos. 2 and 5 are both excellent, and which it would be advisable to use would depend largely upon the prices of the different grains.

RESULT OF ONE EXPERIMENT WITH CHICKENS OF DIFFERENT AGES FED BY DIFFERENT METHODS—EXPERIMENT BEGAN OCTOBER 2ND.

Groups.	Grain fed during the first 2 weeks.	Milk fed.	Cost of feed for first 2 weeks.	Gain in 2 weeks.	Cost one pound of gain.	Feed used during the last 10 days.	Milk used.	Gain during last 10 days.	Cost of food for last 10 days.	Cost of one pound of gain.	Total cost for 24 days' feeding.	Total gain during 24 days.	Cost of one pound of gain (24 days.)	Selling price per pound.	How fed.
	lb.	lb.	cts.	lb.	cts.	lb.	lb.	lb.	cts.	cts.	cts.	lb.	cts.	cts.	
No. 10. Average weight 3½ lbs. each (when put up to feed)	41	41	54 12	12	4.51	30	30	3	39.6	13.2	93.72	15	6.248	10	Fed in the fattening crates from the trough only.
No. 11. Average weight 3½ lbs. each...	40	40	52.80	12.75	4.14	36	48	9	53 40	5.93	106.2	21 75	4.88	11	Fed for the first two weeks in the fattening crates from the trough ; the last 10 days from the machine.
No. 12. Average weight 3½ lbs. each...	38	38	50.16	8	6.27	24	24	3	31.68	10.55	81.84	11	7.44	9	Fed in a pen, each bird having about 5 square feet of floor space.
No. 2. Average weight 2¼ lbs each.	34	34	44.88	6.75	6.65	23.5	24	3	31.07	10.36	75.95	9.75	7.78	9	Fed in a pen, each bird having about 5 square feet floor space.
No. 3. Average weight 2¾ lbs. each...	35.25	35	46.2	11	4.2	32	48	*5½	48.02	8.72	94.22	16.5	5.71	11	Fed for the first two weeks in the fattening crate from the trough only ; the last ten days by the machine.
No. 4. Average weight 2¾ lbs. each ...	34	34	46.2	11.25	4.11	27	27	6	35.64	5.94	81.84	17.25	4.74	10	Fed in the fattening crates from the trough only.
No. 20. Average weight 4⅓ lbs. each...	47.5	48	62.75	11.5	5.45	40	40	6	52.80	8.8	115.55	17.5	6.60	10	Fed in the fattening crates from the trough only.
No. 21. Average weight 4⅓ lbs each ...	44	48	63.36	11.75	5.39	44	66	11	66	6	129.36	22.75	5.68	11	Fed in the fattening crates the first two weeks from the trough only ; last 10 days from the machine.
No. 22. Average weight 4⅓ lbs. each...	41	41	54.12	8.5	6 367	26	28	4	34.32	8.58	88.44	12.5	7.07	9	Fed in a pen, each bird having about 5 square feet of floor space.

* One bird in this group died, apparently not being able to stand feeding by the machine.

Conclusions.

From the above, it will appear that a chicken weighing about 3½ pounds is the most desirable for feeding purposes.

It is also evident that the plan of putting chickens into crates for fattening is to be

Fig. 19.—A well set up Minorca Cockerel that the photo does not do justice to

Fig. 20. Minorca Pullet that bids fair to outdo her dam. (See Fig. 18).

commended; and, further, that by using a cramming machine a bird can be finished or made to present a finer appearance when dressed than by feeding of its own accord.

It was also shown that the crated birds, and those fed by the machine in addition, were far more profitable than those fed loose.

Some experiments have also been conducted where a supply of roots was added to the grain ration. The results thus far obtained seem to indicate that there is no advantage in feeding roots. Potatoes, however, give an extra amount of gain in flesh, and at a moderate cost may be regarded as an economical food.

The following extract from a letter will give some idea of the quality of the chickens we have fatted:—

"I must say that in my long experience of over forty years, I have never met with any man who can turn out poultry in so good a condition as the chickens I have had from your College. They are a credit to you in every respect, both feeding, color, killing etc. I only wish I could get 500 or 1,000 people at different points in Canada to turn out poultry in the same fashion. I would be too glad to have the opportunity of taking all they would have.—J. Ruddin.

I may add that Mr. Ruddin is one of the largest poultry and game merchants in Liverpool.

What we have accomplished is within the reach of any person who will take a little trouble in feeding, killing and plucking their chickens.

We are carrying over to the first of the year a much greater number of chickens than in any previous year. This has been necessary owing to the establishment of the Poultry School, as it will be advisable in giving instruction to students in fattening chickens, for each to have an opportunity to feed a crate or more of fowl through the whole fattening period. We have also on hand a number of good pure bred cockerels and

pullets. These are being held with the view of disposing of them to farmers and others as breeders. It would indeed seem a pity to fatten and kill such birds. These two factors having necessarily made the revenue somewhat less than had been expected early in the year.

To give an idea of the stock on hand now as compared with that on hand last year, the following list is given :—

Variety.	1899.			1900.			1901.		
	Cocks.	Hens.	Value.	Cocks.	Hens.	Value.	Cocks.	Hens.	Value.
			$ c.			$ c.			$ c.
Barred Plymouth Recks	3	36	38 00	56	100	135 00	76	150	196 00
White Plymouth Rocks	1	9	10 00	2	12	14 00	15	31	37 00
Buff Plymouth Rocks	1	6	7 00	1	9	10 00	5	21	25 00
Silver-Laced Wyandottes	1	9	10 00	3	18	20 00	2	8	10 00
White Wyandottes	4	9	12 00	6	15	19 00	1	10	11 00
Langshans	1	6	7 00	1	6	7 00	3	21	20 00
Black Minorcas	1	10	11 00	8	18	22 00	10	39	40 00
Brown Leghorns	2	10	12 00	7	11	15 00	2	18	16 00
White Leghorns	1	9	10 00	7	14	18 00	10	20	25 00
Andalusians	2	8	10 00	9	22	27 00	11	32	43 00
Light Brahmas	2	10	12 00	5	22	26 00	1	14	15 00
Dorkings	1	3	4 00	2	6	8 00	1	5	5 00
Houdans	1	3	4 00	1	3	4 00	1	3	4 00
Orpingtons				1	2	3 00	1	3	4 00
Grades		76	30 40	150	128	111 20	125	138	105 20
Ducks :	Drakes	Ducks		Drakes	Ducks		Drakes	Ducks	
Pekin	2	8	10 00	3	7	10 00	2	6	8 00
Cayuga				1	5	6 00	3	9	12 00
Rouen				1	2	3 00	1	3	4 00
Indian Runner				1	1	2 00	1	3	4 00
Grade		3	1 50		3	1 50		3	1 50
Total	23	215	$188 90	265	410	$171 70	271	536	$585 70

My many thanks are due to the heads of the other departments, who have rendered kindly assistance in many ways.

Respectfully submitted,

W. R. GRAHAM,

Manager of Poultry Department

PART XIII

REPORT OF THE LECTURER ON APICULTURE.

To the President of the Ontario Agricultural College :

SIR,—I have the honor to submit herewith a brief report upon the work done in the Department of Apiculture for the year 1901.

INSTRUCTION. Since the College closes in April, it is impossible to give *practical* instruction in bee-keeping, because only a few students stay at College during those months which chiefly concern the bee-keeper, viz, May, June and July. However, a hive is kept on the lawn during the first part of the fall term, and as much practical work is got out of that as the weather and season permit. The greater part of the teaching is given in the class room and, since bee-keeping is as much of an art as a science, it is rather difficult to reproduce to the mind of the student the various manipulations that the bee-keeper goes through. However, by means of the blackboard and the appliances at my command, I try hard to show the classes the way to manage an apiary from the middle of April, through the "building up" and swarming seasons until early autumn, when preparations for wintering commence. The lectures are of value chiefly to those who have already become interested in bees. They supplant their more or less hazy and erroneous impressions by more positive knowledge.

If twenty five dollars were expended in appliances, the instruction could be made more practical.

EXPERIMENTS.

CONTROLLING THE FERTILIZATION OF QUEENS. For years, bee-men have been trying to mate their virgin queens with whatever drones they choose to select. D. A. Jones established queen rearing stations upon the islands of the Georgian Bay—a separate island for each race of bees. Coition always takes place in mid-air, and then the queen drops to the ground; and in such case, whenever it happened over water, the queen was invariably drowned. Some have tried buildings of netting and also of glass; but queens and drones fly directly to the netting or glass and devote their whole attention to getting out, without seeing each other. Last July, I made the following experiment. I placed a large carboy of glass, neck downwards, and introduced two virgin queens into it. As they were flying up the glass sides of the carboy trying to get out, a dozen drones which were in a cage were introduced also. The drones immediately fluttered up the glass to the queens above and coition took place. This experiment was tried with eight queens in all and seven were fertilized. The eighth may not have been virgin before being introduced into the carboy.

A little patience is sometimes necessary. When drones do not see a queen, the drones and queens must be shaken down to the bottom of the carboy, so as to induce them again to flutter up the glass; and when drones and queens are flying with their wings almost touching, coition is almost sure to take place.

THE UTILIZATION OF PARTIALLY FILLED SECTIONS.

The experiment made last year in feeding back sections that were not saleable was further carried on this summer. This experiment consisted in laying by a certain number of supers containing unfinished sections, dividing them into two equal parts and placing the one half of them upon hives to be filled up from the other half which were fed back after the manner of the Boardman feeder.

This year after the third super had been fed to a colony, the bees became laggy, and finally refused to work, and in one case they capped over the sections in the feeder, plainly shewing that they took the feeder and hive to be all one hive. To overcome this, I placed a pile of supers containing unfinished sections one hundred yards from the bee-yard and almost closed them up, leaving an aperture large enough to admit only one bee at a time. Some of the caps of the sections were smashed, and bees from the hive to be

fed placed upon them. They carried stores from these supers to their hive and brought back other bees. In time, bees from other colonies discovered these supers too ; but, curiously enough, the bees from the first hive treated them as robbers and kept them out of the supers. The colony got over its laziness, soon emptied the supers, and placed the stores thus obtained in the sections on their hive, and all but about five per cent. of these sections were well built out.

Respectfully submitted,
H. R. ROWSOME,
Apiarist.

PART XIV.

REPORT OF THE PHYSICIAN.

To the President of the Ontario Agricultural College.

SIR :—I have the honor of presenting to you my report for the year now closing.

During the winter months we had, as usual during that season, a good deal of sickness amongst the students. Some of the cases were of a serious character and required much attention. I may mention especially two cases of rheumatism and one of lobar pneumonia. All, however, made good recoveries.

A large number of students remained at the College during the summer, and for these and the female help, I did considerable work. Besides giving medical attendance to those who were ill, I vaccinated many of the students who went to the military camp in June.

The autumn term opened with a record breaking attendance, but in common with the rest of the community, the general health of the students has, so far, been unusually good. At one time we seemed threatened with a serious invasion of mumps. Two cases occured, but by prompt isolation of patients and thorough disinfection of rooms, we succeeded in preventing further spread of the disease.

During the summer there were made in the building, alterations by which eighteen new rooms were added to the dormitories. These rooms are all comfortable, well lighted and well ventilated apartments. In this connection may I remark that, in my opinion, the large increase of resident students necessitates additional bath-rooms, and that some improvements might be made in those now in use.

In closing I desire to thank you for setting apart a room for the use of the College Physician. This has filled a long felt want, and has already proved of great advantage to all interested.

Respectfully yours,

W. O. STEWART,
College Physician.

INDEX.

Agriculture in Europe, 82.
Agriculture, Report of Professor, 56.
Alkaline Solutions, 80.
Alterations and Additions, vii.
Apiculture, Report of Lecturer, 126.
Associate Diploma Recipients, xviii.

Bacterial Infection of Cheese, 77.
Bacteriology, xv, 74.
Bacteriology, Report of Professor, 74.
Barley, 63, 87.
Beans, 92.
Bees, xvi. 126.
Biology, xii, 16, 26.
Biology, Report of Professor, 16.
Biology, Report of Associate Professor, 26.
Birds, 31-34.
Black Raspberries, 70.
Black Rot of Grapes, 24.
Botany, 16, 19.
Buckwheat, 90.
Butter, 48-53, 78.
Breeding-pen House, 113.
Brooder House, 113.
Buildings, New, vii.

Calves, Feeding, 54,
Cheese Experiments, 38, 45-48.
Cheese Factories, Bacterial Infection, 77.
Chemistry, xii, 35.
Chemistry, Report of Professor, 35.
Churn, Columbia Air, 81,
Class-room Work, xvii.
Clovers, 105, 106, 108.
Codling Moth, 19.
Cold Storage, 6, 11, 48, 53.
Cold Storage for Curing Cheese, 48.
Colony House, 114.
Columbia Air Churn, 81.
Co-operative Experiments, xvi, 83.
Co-operative Fruit Experiments, 72.
Corn, 64, 93, 99.
Corn *vs.* Peas, for Fattening Steers, 58.
Corn Silage *vs.* Roots for Steers, 56.
Cultivation Experiments, 86.
Cultures for Butter, 48.
Currants, 70.
Curing Cheese in Cold Storage, 48.
Curing-rooms, Light *vs.* Dark, 47.

Dairying, xiii, 44.
Dairying, Report of Professor, 44.
Dairy Herd, 54-55.
Dairy School, 44.
Dean, H. H., Report of, 44.
Diseases of Live Stock, 43.
Doherty, Manning W., Report of, 34.
Drill, xvii.
Ducks, 119, 124.

Egg production, 112, 114.
English, x, 1.
Entomology, 17.
Excursions, xvii.
Experimentalists, Report of, 82.

Farm, xiv, 63.
Farm Superintendence, 63.
Fattening House, 115.
Feeding, xiv, 54.
Field Experiments, xvi, 82.
Financial Statement of Farm Department, 66.
Financial Statement of President, xxi.
First-class Men, xix.
Flax, 93.
Fruit Experiment Stations, 73.
Fruit in Cold Storage, 11.
Fungous Diseases, 18.

Geology, 17.
Geology, Report of Professor, 16.
Gooseberries, 71.
Graduates in 1901, xviii.
Graham, W. R., Report of, 112.
Grain Rusts, 20.
Grapes, Black Rot of, 24.
Grasses, 105, 106, 108.

Hanrahan Cold Storage System, 6, 9, 10, 53.
Harcourt, R., Report of, 35.
Haseltine Trap Lantern, 19.
Hatching Season, 117.
Hay Mixtures, 106.
Herbarium, 29.
Honey Experiments, 126.
Horticulture, xv, 67.
Horticulture, Report of Professor, 67.
Hutt, H. L., Report of, 67.

Incubating, 119.
Insects, Injurious, 18.
Intercollegiate Stock Judging, xiv.

Japanese Beans, 92.
Kohl Rabi, 101.

Laboratory Instruction, 16.
Leguminous Crops for Green Fodder, 103.
Lightning Investigations, 2.
Live Stock, 64.
Lockhead, Wm., Report of, 16.

Macdonald Gifts, viii.
Mangels, 63, 64.
Massey Gifts, vii.
Milk, Care of Cheese-making, 45.
Milk Supply, Hints to Patrons, 51.
Millet, 93, 104.
Mills, President James, Report of, vii.
Mixed Grain, 63.
Moisture and Salt in Butter, 49.
Mustard Spraying, 26.

Oats, 63, 86, 87, 100.

Pan-American Fruit Exhibit, 72.
Parchment Butter Paper. 53.
Pasteurization of Milk 51.
Pasture, 109.
Peas, 63, 90, 91, 100.
Peas *vs.* Corn for Fattening Steers, 58.
Physician, Report of, 127.
Physics, xii, 1.
Physics, Report of Professor, 1.
Plowing Experiments, 86.
Potatoes, 64, 94, 95.
Pound Prints for Export Butter, 53.
Poultry, xvi, 36, 74, 112.

Poultry, Food Analysis, 36.
Poultry, Investigating Diseases of, 74.
Poultry, Report of Manager, 112.
President, Report of, vii.
Prizes, xix.
Pure-bred Swine Experiments, 60.

Queen Bees, Controlling Fertilization, 126.

Rainfall and Temperature, 15.
Rape, 64, 10.
Raspberries, 69.
Reed, J. H., Report of, 42.
Reynolds, J. B., Report of, 1.
Roots, 96.
Roots for Swine Feeding, 58.
Roots vs. Corn Silage for Steers, 56.
Rowsome, H. R., Report of, 127.
Rust of Grain, 20.
Rye, 89.

Salt and Moisture in Butter, 49.
Scholarships, xix.
Seed Grain Selections, 84, 85.
Sheep, 65.
Short Special Courses, v.
Soap Analysis, 36.
Sorghum, 36, 94, 100.
Sorghum Ensilage, 36.
Soy or Soja Beans, 92.
Spring Wheat, 88.
Staff Changes, x.
Steer Feeding, 58-62, 65.
Stewart, Dr. W. O., Report of, 127.
Strawberries, 68.
Students, Number, Religion, etc., viii.
Sugar Beets, 37, 38, 63, 64, 97.
Sunflowers, 94.
Swine, 58-62, 65, 66.

Temperature and Rainfall, 15.
Testing Cows, 51.
Tomatoes, 71.
Turnips, 64.
Turnip Taint, 51.
Tussock Moth, 19.

Ventilation of Farm Stables, 11.
Vetches, 93, 102.
Veterinary Science, xii, 42.
Veterinary Science, Report of Professor, 42.

Washing Curds, 46.
Water Analysis, 35, 79.
Weevil Proof Peas, 91.
Wheat, 63, 88.
Winter Wheat, 88.

Zoology, 17.
Zavitz, C. A., Report of, 82.

TWENTY-THIRD

ANNUAL REPORT

OF THE

Agricultural and Experimental Union

1901.

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AGRICULTURAL AND EXPERIMENTAL UNION.

1901.

To the Honorable John Dryden, Minister of Agriculture:

SIR,—I have the honor to present herewith the Twenty-Third Annual Report of the Ontario Agricultural and Experimental Union.

Respectfully submitted,

C. A. ZAVITZ,
Secretary.

Ontario Agricultural College,
Guelph, December 31st, 1901.

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Atkinson, Alf	Seaforth.	Eddy, Edgar	Scotland.
Atkinson, Geo. L	Hamstead, London, Eng.	Elderkin, D. T	Amherst, N.S.
Avila, C	Cordoba, Arg. Rep	Elford, F. C	Holmesville.
Baker, R. G	Swarthmore, Pa., U.S.	Elliott, G. W	Cathcart.
Barber, T. C	Yorkton, Assa	Esmond, C. W	Blessington.
Barber, E. R	Devil's Lake, Assa.	Evans, Jno	Randolph.
Bartman, R. W	Hamilton	Fansher, B. W	Florence.
Barton, Horace	Vankleek Hill.	Farlinger, W. R	Morrisburg.
Beecroft, A.D	Woodville.	Fawcett, C. F	Upper Sackville, N.B.
Bell, H. H	Colpoy's Bay.	Ferguson, A S	Kenlis, Assa.
Bell, Geo. R	Glanford Station	Ferguson, J. F	Spring Hill
Benson, Jno. C	Picton.	Filion, A. J	Arundel, Que.
Bingeman, G. W	Bloomingdale.	Flack, A. R	Banda.
Black, D. A	Kingston.	Fulmer, H. L	Ruthven
Black, W. J	Mansfield.	Galbraith, D. H	Ellesmere
Bower, J E	Harriston.	Gamble, W. P	O. A. C., Guelph.
Boyd, F. J	Merrickville.	Geddes, M	O A. C. Guelph.
Bowman, E	Bloomingdale.	Gilbert, A. G	Bayside.
Bray, C. I	Kleinburg	Gilpin, B. C	Summerville.
Breckon, Wm. D	Waterdown.	Goble, F. W	Woodstock.
Brereton, F. E	Bethany.	Goodchild, A	Craigieith.
Broderick, F. W	St. Catharines.	Graham, W. R	O. A. C., Guelph.
Brodie, G. A	Bethesda.	Greig, R. W	Toronto.
Brown, S. P	Birnam.	Griffith, L	Byron
Brush, Geo	Villard, Minn., U.S.	Grisdale, J. H	Expt. Farm, Ottawa.
Buchanan, D	Florence.	Groh, Herbert	Prestan.
Budd, W	Sweaborg.	Groves, J. J	Antrim.
Burnett, Arthur	Alma.	Grub, Ignatius	Badenoch.
Burns, E. H	St Marys.	Gunn, W. H	Ailsa Craig.
Bustamante, R. S	Jujuy, Arg. Rep.	Gunn, R E	3 Rosedale Rd., Toronto.
Calder, A. C	Lancaster.	Gunn, J. F	78 Front St., Toronto.
Cameron, R R	Ailsa Craig.	Hadwin, G H	Duncans, B.C.
Campbell, J. A	Simcoe.	Hall, J. S	Weisenburg.
Carpenter, G. H	Fruitland.	Hallman, E. C	Washington.
Carson, W. J	Vernon.	Hambly, V. S	Drayton.
Cayford, W. B	Westmont, Que.	Hamilton, W	Ravenshoe.
Chisholm, John	Briley Brook, N.S.	Hankinson, L. D	Gravesend.
Christie, G. I	Winchester.	Harcourt, Prof. R	O. A. C., Guelph.
Clark, E. E	Meaford.	Harcourt, Geo	Winnipeg, Man.
Clark, A. B	Summerstown.	Harcourt, W. V	St. Ann's.
Clarke, A	Smith's Falls.	Harvey, W. H	Exeter
Clarke, G. H	Ottawa.	Hawke, A. H	Winnipeg, Man
Clarkson, F. L	Sweaborg.	Henderson, T. B. R	Rockton.
Cleal, G. E	Dayton, O., U.S.	Henderson, R. D	Addingham, Man.
Cleal, J. P	Dayton, O., U.S	Henry, G. S	Don.
Coben, Henry	Kinmount.	Higginson, W. A	Hawkesbury.
Coglon, M. F	Bath.	Hogaboom, A. B	Caintown.
Cohoe, Wm. J	New Durham.	Hoodless, J B	Hamilton.
Colter, G. L	Mouth of Keswick, N.B.	Horton, D. H	North Pelham.
Cooper, H. G	Oshawa.	Houser, H. W	Campden.
Craig, W. R	North Gower.	Howitt, J. E	Guelph.
Craig, R. D	Ithaca, N.Y., U.S.	Hunt, A. D	O. A. C., Guelph.
Crane, R. N	Montreal, Que.	Hutchison, J. R	St. George.
Crawford, E. A	O. A. C., Guelph.	Hutt, W. N	Southend.
Creelman, G. C	Parliament Bldgs, Tor.	Hutt, Prof. H. L	O. A. C., Guelph.
Crowe, J. W	Ridgeville.	Inglehart, W. F	Palermo.
Cumming, M	O. A. C., Guelph.	Irvine, Alex	Habermehl.
Cutting, A. B	Guelph.	Jacobs, F. S	Minesing.
Davison, J. H	Starrat.	Jarvis, T. D	O. A. C., Guelph
Day, Prof. G. E	O. A. C., Guelph.	Johnston, J	Fingal.
Deachman, R. J	Gorrie	Kennedy, J A	Nassagaweya.
Dean, Prof. H. H	O. A. C., Guelph	Kent, H. L	Oakville.
Del Carriel, A	Buenos Ayres, Arg. Rep.	Ketchen, A P	Brucefield.
De Long, H. M	Brooklin	Klinck, L. S	Victoria Square.
Dewar, W. R	Fruitland.	Klugh, A. B	Guelph.
Dickenson, J. H	North Glanford.	Laird, J. O	Blenheim
Doherty, C. P	Castlemore.	Lawrence, J. L	Bradford.
Downing, R. J	Fenaghvale.	Lee, Thoms	Londesboro.
Drury, E. C	Crown Hill.	Leitch, Wm	Cornwall.
Duff, W. E	Sirton.	Lennox, W. J	Newton Robinson.
Dunlop, J. S	St. Catharines.	Lester, H. H	Burford

MEMBERS FOR 1901-1902.—*Continued.*

Name.	Post Office.
Lewis, Geo.	Ballymote.
Lick, Elmer	Oshawa.
Linklater, J. R.	Stratford.
Lochhead, Prof. W.	O. A. C., Guelph.
Mason, T. H.	Straffordville.
Mason, N. W.	Norwich.
Mason, W. E.	Tyrrell.
Mayberry, H.	Ingersoll.
Mayotte, Victor	Montreal, Que.
Middleton, J. R.	Clinton.
Mills, Dr. Jas	O. A. C., Guelph.
Mills, P. G.	Sussex, N.B.
Monteith, Nelson	Stratford.
Mooney, J. A	Valley River.
Moorehouse, L. A	Cairo.
More, Jas	Kirkton.
Mortimer, R. E	Honey Wood.
Morton, Wm.	Bethany.
Moss, D. E.	Lyons.
Muir, L. McD.	Port Elgin.
Murphy, J. P	Sussex, N.B.
Murray, R. S.	Toronto.
Murray, Jas	Avening.
McAulay, J. W.	Winnipegosis, Man.
McAuslan, A. T.	Heathcote.
McCalla, G. B	O. A. C., Guelph.
McCallum, J. M.	Shakespeare.
McCarthy, D. J.	Kingston.
McDiarmid, H. S.	Fingal.
McDonald, D. J	Crawford.
McDonald, A. M.	Oaklands, Toronto.
McDonald, W. T	Teeswater.
McDonald, T. D.	Crawford.
McFaden, H	Caledon.
McFeeters, J. A.	O. A. C., Guelph.
McIntyre, J. E.	Renfrew.
McIntyre, G. A	Renfrew.
McKenzie, W. G	Fairview.
McKillican, W C.	Vankleek Hill.
McKray, A. N	Croydon, Surrey, Eng.
McLaren, P. S.	McGarry.
McLaurin, Jno. D	Vankleek Hill.
McMillan, E. J	Charlottetown, P.E.I.
McNaughton, F. B	Balderson.
McRae, C. McF	Cumberland.
Nancekivell, G M	Ingersoll.
Newman, L. H.	Andrewsville.
Nicholson, C	Teviotdale.
Orvis, W. G	Dryden.
Panelo, Julio	Buenos Ayres, Arg. Rep.
Partridge, N. W	Crown Hill.
Paul, R H.	Bath.
Pearce, S. M.	Iona.
Peart, H S	Nelson.
Peltzer, Jorge	Buenos Ayres, Arg. Rep.
Peters, C.	Elmhurst, N.B.
Peterson, G	Hawkesville.
Phillips, A. E	Rossmore.
Pickett, B. S.	O. A. C., Guelph.
Pipes, A. S	Amherst, N S.
Pope, D. I	Cookshire, Que.
Pritchard, A. T	Fergus.
Procunier, Geo. A.	Bayham.
Rack, F. W	Port Hope
Randell, J. R	Trail, B.C.
Rankin, R. B	Toronto
Raynor, T. G.	Rosehall.
Readey, J. C.	Rosetta.
Reed, F. H	Georgetown.
Reynolds, R. H	Scarboro Junction.
Rienke, E. C.	Ancaster.
Rivara, J. B.	Buenos Ayres, Arg. Rep

Name.	Post Office.
Rive, Henry	Guelph.
Rivett, T. B	Spanishtown, Jamaica.
Roberts, W. P.	Sparta.
Robinson, Geo. H	Walkerton.
Robinson, F. H	Brampton.
Robinson, Byron	Wheatley.
Ross, N. M.	Ottawa.
Ross, H. E.	Strange.
Rothwell, G. B.	Ottawa.
Ross, J. G	Montreal, Que.
Rowsome, S. J	Brockville
Rush, J. C	Humber Bay.
Russell, D. A	Ballinafad.
Russell, C. J	Ballinafad.
Rutherford, W. J	O. A. C, Guelph.
Scott, Peter	Waubuno.
Shearer, F J.	Vittoria.
Shuh, C. H	Waterloo.
Silcox, F. H.	Iona.
Sloan, R R	Blyth.
Smith, R. S	Toronto.
Smith, H. D	Tilsonburg.
Smith, R. B.	Columbus.
Smuck, I.	Renforth.
Snyder, Martin	Norwich.
Spence, W.	Calton.
Squirrell, Wm., sr	O. A. C., Guelph.
Squirrell, Wm., jr	O A. C., Guelph.
Stanton, K. B.	Chicago, Ill., U.S.
Starke, J. H	Lang.
Stauffer, G. A.	Ringwood.
Stewart, C J.	Winfield.
Stewart, D. F.	Hampstead.
Stewart, A. J	York Mills.
Strachan, H. G.	Montreal, Que.
Strachan, C. L	McKenzie, Man.
Strachan, D.	Jamestown.
Stratton, R. W	O. A. C., Guelph.
Streit, Dr. H.	O. A. C., Guelph.
Sutherland, T	Stratford.
Taylor, Jno	Todmorden.
Taylor, C. M.	Todmorden.
Taylor, Frank	Cumberland Mills, P.E.I.
Treple, H. C	Jaffa.
Thom, C. C	Elma.
Thompson, H. H	Heathcote.
Thompson, Hugh	Magnetawan.
Toole, Louis	Mt. Albert.
Trenholme, J G	Westmount, Que.
Vanatter, P. O.	Knoxville, Tenn., U.S.
Vipond, J. M	Donegal.
Wagg, A J	Mindemoya.
Wait, J. W	St. George.
Warner, G. C	Coulson.
Ware, J. T	Allanburg.
Waters, R. J.	Ivan.
Watson, J. A.	Seagrave.
Weekes, H. M.	Glencoe.
Weir, J	Dundas.
Wells, E. W	Chilliwack, B.C.
Westgate, W. H	Watford.
Westover, C. A	Frelighsburg, Que.
Whiteside, A. E.	O. A. C. Guelph
Whyte, G. G	Paris.
Winter, M. H	Wicklow.
Williams, R. H	Corbetton.
Wilson, E. S	Winnipeg, Man.
Witter, G	Listowel.
Yeo, W. J	Ryckman's Corners.
Young, Alex	Glanford.
Zavitz, C. A.	O. A. C Guelph.
Zavitz, C. J	Forks Road.
Zavitz, H. V.	Coldstream

THE AGRICULTURAL AND EXPERIMENTAL UNION.

ANNUAL MEETING.

The twenty-third annual meeting of the Ontario Agricultural and Experimental Union was held at the Ontario Agricultural College on Monday and Tuesday, December 9th and 10th, 1901.

The President of the Union, Mr. T. H. Mason, Straffordville, Ontario, presided over the three day sessions; Miss Laura Rose, Guelph, Ontario, presided at the Ladies' Session, and Dr. James Mills acted as Chairman at the evening session, and also at the annual banquet.

TREASURER'S REPORT.

By Prof. H. L. Hutt, Agricultural College, Guelph, Ont.

Receipts.		Expenditure.	
Balance from 1900	$ 55.30	Agricultural experiments	$ 680.21
Membership fees	139.00	Horticultural experiments	225.75
Government grant	1,400.00	Poultry experiments	16.10
		Part expenses annual meeting, 1900	99.70
		Part expenses annual meeting, 1901	76.00
		Meeting of Executive	16.15
		Salary of Secretary	205.00
			$1,318.91
		Balance on hand	275.39
	$1,594.30		$1,594.30

We, the undersigned Auditors, beg leave to say that we have examined the accounts of the Treasurer and have found them correct.

T. G. Raynor.
Elmer Lick.

December 1st, 1901.

SECRETARY'S REPORT.

By C. A. Zavitz, B.S.A., Agricultural College, Guelph, Ont.

The reports, papers and discussions given at the annual meeting of the Experimental Union for 1900 were prepared for publication and sent to the Ontario Department of Agriculture in January, 1901. The material was printed in Toronto, and filled a volume of 63 pages. As there were about 25,000 copies of the report printed it will be seen that the results of the Union work were brought very prominently before the farmers of Ontario.

Three meetings of the Board of Control have been held since the last annual meeting of the Experimental Union, two in December, 1900, and one in October, 1901.

At our last annual meeting a committee was appointed to interview the Hon. John Dryden, Minister of Agriculture for Ontario, asking that the grant to the Union be increased in 1901 from $1,200 to $1,500. The members of this committee attended to their appointment, and were instrumental in having the grant of the Union increased from $1,200 to $1,400 for the present year.

In 1901, co-operative experiments were conducted throughout Ontario in agriculture, in horticulture and in poultry raising. The summary results of these experiments conducted on upwards of 3,000 Ontario farms within the past year, will be presented and discussed at the different sessions of this meeting.

The Experimental Union was never in a more thriving condition than it is at the present time. The membership is larger than ever before, the experimenters are deeply interested in the work, and new and important lines of co-operative work are opening up. We are greatly pleased that the public press, not only of Ontario, but also of other Provinces of the Dominion, is taking so much interest in our co-operative work and is reporting the results of this work so fully through the columns of the agricultural journals and the principal papers of the Dominion. We are greatly pleased to have at this meeting press representatives from London, Guelph, Toronto, Ottawa, Montreal and Winnipeg. The Experimental Union certainly has good ground for encouragement in pressing onward with its good work.

PRESIDENT'S ADDRESS.

By T H. Mason, Staffordville, Ont.

We meet to-day under favorable circumstances. The country is in a good financial condition, and the great basic industry of agriculture is more prosperous than it has been at any time during the last decade.

The opening of the new century is a favorable time to consider our position as agriculturists and to form plans for greater success and usefulness in the future. Now we know that we are meeting with the most strenuous competition in the markets of the world, and that the signs all point to that competition becoming more intense in the future, and, while not underestimating the value of cheap and improved transportation and perfected cold storage to the markets of the world, still we must all admit that the very essence of successful agriculture rests upon large crop production. When we reflect that the cultivated area of Ontario now reaches nearly 13,000,000 acres, and that if by the introduction of improved methods and better varieties we could increase the average yield to the value of the very trifling sum of 50 cents per acre we can see something of the possibilities and value of the work of our Union to the Province. The Minister of Agriculture and the Legislature have in the past recognized the value of this work, and our thanks are tendered to them for the increased grant that was made to the Union last session.

The Union was primarily intended as a bond among the students and ex-students of the O.A.C., but while fulfilling its original purpose it has developed into an "experimental extension movement," widening and extending the work of this Experimental Station to all parts of the Province, and proving the adaptability of the work done here to the different sections of Ontario. New fields are opening to this work, a New Ontario is being entered upon, and new problems are pressing upon us for solution. The zone of successful agriculture and horticulture is ever widening in this Province, and by the introduction of early ripening and hardy varieties of cereals and fruits from Northern Europe we may render a service to the pioneers of Northern Ontario which can hardly be overestimated. Much work has been accomplished in the past and that work has been done at a very small cost to the country at large.

G. C. Creelman: In my official capacity as superintendent of Farmers' Institutes, I come in contact with farmers in every part of Ontario, and I find that thinking farmers in all parts of the Province are of the opinion that no work has done so much to increase the yield of our farm crops as the work caried on by this Union. This is a justification not only for the expenditure involved in maintaining this Union but for the entire cost incurred in carrying on the whole work of the Agricultural College.

CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

By C. A. Zavitz, B.S A., Director of Experiments, Agricultural College, Guelph.

The co-operative experimental work was started in Ontario in 1886, with twelve experimenters. In 1901 there were upwards of 3,000 Ontario farmers conducting the co-operative tests upon their own farms. The average number of experimenters each year for the four years ending with 1889 was 73; with 1893, 557; with 1897, 2,059, and with 1901, 3,157. The experiments were located in both New Ontario and Old Ontario, and on small farms as well as on large farms, and the experimenters themselves comprised men and women, highly educated and self-educated, old and young, married and single, rich and poor, who did the work for their own good and for the good of others.

Both the financial and the educational influences of this work throughout Ontario are great. The benefits are not confined to the experimenters themselves, but are shared by thousands of others who examine the growing crops, who attend the annual meetings, who read the annual reports, or who become familiar with the results through the columns of the public press, in the meetings of the Farmers' Institutes and in various other ways.

The letters and reports which are received from experimenters throughout Ontario show the keen interest which is taken in the work, and indicate something of the influences of these experiments in the various localities where they are carried on. The following quotations are taken from letters and reports just received :

Ten thousand people saw my experiment.—Charles Wilson, Peel County.

Fully a thousand people were looking at the plots when the crops were growing.—J. V. Brownrigg, Prescott County.

I believe four thousand people saw my experiment, and many useful lessons were learned. I feel well repaid for my work.—W. H. Davison, Bruce County.

Farmers who experiment are always to the front. About one thousand people saw my experiment this year.—W. B. Ogden, Rainy River District.

My experimental plots gave a great object lesson in agriculture, and farmers came regularly to watch the progress of the experiment.—D. Dwyer, Wentworth Co.

The only way to find out which varieties of farm crops will give the best results is to grow them side by side.—D. Buchanan, Kent County.

My experimental work is of great educational value to me.—Cyrus D. Lawrence, Parry Sound District.

The experimenters deserve great credit in successfully conducting the various experiments during the past season, and the farmers of Ontario owe much to these experimenters for the valuable reports which they have furnished, the summaries of which are to be here presented.

The following circular was sent out in the spring of the present year, and gives the list of experiments as well as other information regarding the work :

CIRCULAR OF CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

Dear Sir,—The members of the Ontario Agricultural and Experimental Union are pleased to state that for 1901 they are again prepared to distribute into every Township of Ontario material for experiments with fertilizers, fodder crops, roots, grains, grasses, and clovers. Upwards of 1,200 varieties of farm crops have been tested in the Experimental Department of the Ontario Agricultural College, Guelph, for at least five years in succession. These consist of nearly all the Canadian sorts and several hundred new varieties, some of which have done exceedingly well in the carefully conducted experiments at the College, and are now being used for co-operative experiments throughout Ontario.

This system of co-operative experimental work in Agriculture was started in 1886 with 60 plots, which were situated on twelve different farms in Ontario. Since that

date, however, the work has increased from year to year, and in 1900 there were 8,335 plots, which were situated on 3,363 farms throughout Ontario.

Each person in Ontario who wishes to join in the work may choose any one of the experiments for 1901, fill out the accompanying form of application and return the same to the Director of the Co-operative Experiments in Agriculture at as early a date as possible. The material will be furnished in the order in which the applications are received until the supply is exhausted. A sheet containing the instructions for conducting the chosen experiment, and the blank form on which to report the results of the work, will be sent to each experimenter at the time the fertilizers or seeds are forwarded. All material will be furnished entirely free of charge to each applicant, and the produce of the plots will, of course, become the property of the person who conducts the experiment. In return, the Committee on Agricultural Experiments desires to ask that each experimenter will sow all the plots belonging to the particular experiment which he has chosen for 1901, and that he will be very careful and accurate in his work, and forward to the Director a complete report of the results obtained from the test, as soon as possible after the plots are harvested.

All fertilizers and seeds will be sent in good time for spring seeding, providing the applications are received at an early date. The supply of material being limited, those who apply first will be surest of obtaining the desired outfit. It might be well for each applicant to make a second choice, for fear the first could not be granted. The experiment selected should be indicated by using its number as given in the left hand column in the list of experiments. Further information is given on the application form which is enclosed.

List of Experiments for 1901.

Grain Crops.

1—Testing three varieties of Oats.. 2
2—Testing three varieties of six-rowed Barley.. 3
3—Testing two varieties of Hulless Barley 2
4—Testing Spelt and two varieties of Spring Wheat.. 3
5—Testing two varieties of Buckwheat.. 2
6—Testing three varieties of Field Peas for Northern Ontario 3
7—Testing two varieties of bug-proof Field Peas.. 2
8—Testing Cow Peas and two varieties of Soja or Japanese Beans 3
9—Testing three varieties of Husking Corn.. 3

Root Crops.

10—Testing three varieties of Mangels 3
11—Testing two varieties of Sugar Beets for stock feeding.. 2
12—Testing three varieties of Swedish Turnips.. 3
13—Testing Kohi Rabi and two varieties of Fall Turnips.. 3
14—Testing Parsnips and two varieties of Carrots.. 3

Forage, Fodder, Silage and Hay Crops.

15—Testing three varieties of fodder or silage Corn.. 3
16—Testing three varieties of Millet.. 3
17—Testing three varieties of Sorghum 3
18—Testing Grass Peas and two varieties of Vetches 3
19—Testing Dwarf Essex Rape and two varieties of Kale 3
20—Testing three varieties of Clover.. 3
21—Testing Sainfoin, Lucerne and Burnet 3
22—Testing five varieties of Grasses.. 5

Culinary Crops.

23—Testing three varieties of Field Beans 3
24—Testing three varieties of Sweet Corn.. 3

Fertilizer Experiments.

25—Testing fertilizers with Corn 6
26—Testing fertilizers with Mangels 6

Miscellaneous Experiments.

27—Growing Potatoes on the level and in hills 2
28—Planting Potatoes the same day and five days after being cut 2
29—Planting Cut Potatoes which have and which have not been coated over with land plaster.. 2
30—Planting Corn in rows and in squares (an excellent variety of Early Corn will be used).. 2

The size of each plot in each of the first twenty-six experiments is to be two rods long by one rod wide; in Nos. 27, 28 and 29 one rod square; and in No. 30 four rods square (one-tenth of an acre).

Some Advantages of the Co-Operative Experiments.

1. Farmers who conduct these co-operative experiments in their own fields with varieties of farm crops, methods of cultivation, ways of increasing soil fertility, etc., obtain valuable information which they cannot possibly get in any other way.
2. The Union furnishes a good method by which farmers can secure pure seed of the best varieties of grain, root, fodder, silage and hay crops to test on their own soils, and thus find out in a very practical way which special kinds are best suited to their own particular farms.
3. Experimental work encourages careful handling, close observation, accurate calculation and economical methods.
4. Experimenters get a start in pure seed of the best varieties of grain crops which rapidly increases in quantity, thus furnishing seed for sowing on large areas and for selling at good prices.
5. The co-operative experiments located on over three thousand Ontario farms form object lessons for the farmers in their respective neighborhoods.
6. Farmers are frequently enabled to purchase pure seed of leading varieties of grain from their neighbors who are successful experimenters.
7. Summary results and important conclusions from successfully conducted co-operative experiments are printed annually in the report of the Experimental Union, which is distributed in large numbers from the Department of Agriculture, Toronto, Ontario.
8. Important features of the experiments are frequently discussed in the field, at the fireside and in the meetings of farmers' institutes.
9. Results of experiments conducted by other farmers and by the Experiment Stations are read and studied with increased interest.
10. Properly conducted experimental work adds pleasure to farm life and forms a very wholesome influence in keeping the boys on the farm.
11. The whole system leads to a substantial increase in farm profits and to a steady advance in agricultural education throughout Ontario.

In order to keep the work systematized and in the clearest form possible, an application form for experimental work was sent with each circular, with a request that those who were desirous of conducting experiments during the coming season fill out the form of application and return it to the College at the earliest convenience. The following circular, which furnishes some information about the experiments, and a blank form for applying for experimental material was used in the spring of 1901 .

Dear Sir,—If you wish to conduct ONE of the thirty agricultural experiments named on the accompanying circular, kindly fill out this blank form and return it as soon as possible.

The distribution will be confined to the choice varieties included in the various experiments. In filling out the blank form, therefore, it is neither necessary nor advisable to mention any particular variety or varieties.

Material for either number 25 experiment or number 26 experiment will be sent by express, and for each of the others it will be forwarded by mail.

Address all communications to C. A. ZAVITZ,
Agricultural College, Guelph, Ont.

Application for Material for an Experiment.

I would like to conduct experiment number ....., but if all the material for that experiment has been applied for before my application is received I select experiment number ..... as my second choice. If the material for one of these two experiments is forwarded to me, I will endeavor to

1. Carry on the test according to the instructions received with the seed,
2. Exercise care and accuracy in the work, and
3. Report the results of the experiment as soon as possible after harvest, whether successful or not.

Name ..... Post Office ..... Express Office ..... Line of Railway.....
County ..... Date of mailing .....

No varieties were sent out except those which had done exceptionally well in the trial grounds in the Experimental Department. As the reports are received from the various experimenters they are examined very carefully, and all those which show any signs of inaccuracy in any way whatever are discarded. For the summary re-

port, nothing but the results which were obtained from carefully conducted experiments were used. Every report which showed that the experimenters did not conduct the experiment with the full amount of material, did not use plots of uniform size and according to instructions, did not give the exact yield, etc., produced on the different plots, was placed to one side and was not used in making the summary, which is here presented. While these summaries should be of great value to the farmers generally, still those who conducted the experiments obtained much additional information regarding the results of their experiments as adapted to their individual circumstances, which it is impossible to convey in a concise report of this kind.

REPORTS OF THE EXPERIMENTS.

The following are the average results of the co-operative experiments successfully conducted over Ontario in 1901 :

Grain Crops.

Experiments.	Varieties.	Comparative value.	Yield per acre.	
			Straw. (tons)	Grain. (bush.
1. Oats (102 tests)	Siberian	100	1.3	42.2
	Improved Ligowa	88	1.2	40.5
	Daubeney	52	1.1	36.9
2. Six Rowed Barley (17 tests)	Mandscheuri	100	1.0	29.1
	Oderbrucker	86	1 1	27.8
	Success	53	.9	22.8
3. Hulless Barley (12 tests)	Black Hulless	100	1 5	20.1
	White Hulless	73	1.4	14.8
4. Spring Wheat (39 tests)	Emmer (in Ontario called Spelt)	89	1.5	24.1
	Goose Wheat	100	1 3	16 5
	Herison Bearded	97	.9	14.0
	Blue Democrat	86	1.3	13.7
	Medeah	73	.8	10 7
5. Buckwheat (2 tests)	Japanese	100	4.2	28.2
	Silver Hull	100	4.3	21.9
6. Peas (27 tests)	Early Britain	100	.8	18.3
	Grass Peas	81	1.1	17.6
	White Wonder	100	.8	17.2
7. Bug Proof Peas (51 tests)	Grass Peas	100	.9	18 9
	Egyptian Peas	69	.6	16 2
8. Soy Beans (13 tests)	Early Yellow Soy Beans	100	1 5	21.4
	Medium Green Soy Beans	86	2.2	18.1
			wh crop	
9. Corn for Grain (19 tests)	North Star Yellow Dent	90	9 3	48.3
	King Phillip	100	8.0	46.2
	Compton's Early	98	9.0	43 6
			straw	
31. Winter Wheat (31 tests)	Dawson's Golden Chaff	100	1 6	27.5
	Diamond Grit	86	1.5	25 1
	Early Genesee Giant	43	1.6	24.2
	Stewart's Champion Red	64	1 7	23.8
	Turkey Red	22	1.6	23 8

Each experimenter was asked to give the relative value of each variety as the result of the experiment conducted on his own farm. In the first column of figures, therefore, in the table here presented, the highest results of the comparative value of the different varieties are given, 100 representing the most popular variety in each

experiment. The yield of straw as here reported means the total crop less the amount of grain, and this would, of course, include the chaff or the husks with the straw or the stalks. The yields of grain are given in numbers of bushels per acre by weight, and not by measure. The weights per measured bushel used in this determination are as follows : Oats, 34 lbs.; six-rowed barley, 48 lbs.; Hulless barley, 60 lbs.; spring wheat, 60 lbs.; buckwheat, 48 lbs.; peas, 60 lbs.; Soy beans, 60 lbs.; corn, 56 lbs., and winter wheat, 60 lbs.

Oats. It will be seen from the results here presented that the Siberian variety of oats occupies first place among the three varieties in popularity and in yield of grain per acre. The Siberian oats also occupied first place in yield of grain per acre in the average results of 125 experiments in 1892, 105 experiments in 1893, 121 experiments in 1894, 78 experiments in 1895, 106 experiments in 1898, 107 experiments in 1899 and 97 experiments in 1900; and it occupied second place in yield of grain per acre in 1896 and in 1897. Not only has the Siberian variety, therefore, given good results at the Agricultural College, but it has also made a very excellent record throughout Ontario. In each of the past two years each experimenter was asked to sow an extra plot with the variety of oats which had proven the best in his past experience. The American Banner variety was used as the extra variety by 16 experimenters in 1900, and also by 16 experimenters in 1901. In taking the average results of these different experiments in each of the two years we find that the Siberian gave 2.6 bushels per acre more than the American Banner in 1900, and 2.0 bushels per acre more in 1901. It will, therefore, be seen that the Siberian has not only given a larger yield of grain per acre than that produced by the American Banner in the average results of twelve years' experiments at the Agricultural College, but it has also given a larger yield in the co-operative experiments over Ontario in each of the years that these varieties have been tested with each other.

Six-rowed Barley. The Mandscheuri barley gave the largest average yield of grain per acre in the comparative tests over Ontario in each of the years 1892, 1893, 1894, 1895, 1896, 1897, 1898 and 1901, and the second largest average yield of grain per acre in 1899 and in 1900. The Oderbrucker barley has given the second largest average yield of grain per acre in the comparative tests over Ontario in each of the years 1892, 1893, 1894, 1895, 1896, 1897, 1898 and 1901, and the largest average yield of grain per acre in 1899 and in 1900. It will, therefore, be seen that the Mandscheuri variety gave better results than the Oderbrucker in each of eight years, and that the Oderbrucker surpassed the Mandscheuri in each of two years. The Success variety has given decidedly the lowest yield per acre in the cooperative experiments in each of the three years during which it has been used.

Hulless Barley. Previous to 1900 no distinct experiment was conducted with Hulless barley, but one variety of Hulless barley was included with the six-rowed barleys for the barley experiment. In 1899 the Black Hulless barley gave a less yield per acre than either of the three six-rowed barleys tested over Ontario. In the results for 1900, it was found that the Black Hulless gave the largest yield of grain per acre of the three varieties of Hulless barley under experiment, and that it was the most popular variety with the experimenters. In the results for 1901, it will be seen that the Black Hulless variety surpassed the White Hulless barley by fully 5 bushels per acre. The White Hulless barley, which is also beardless, has been advertised very extensively within the past few years.

Spring Wheat. In all, five varieties of spring wheat were used for the co-operative experiments in 1901. These represent three different classes of wheat, two varieties being grown principally for the production of flour, two for the production of macaroni, and one as a food for stock. In the average results of thirty-nine tests, the various varieties showed marked differences in the comparative yields of grain per acre. The Emmer, which frequently goes under the name of Spelt, or Speltz, in this country, stands at the head of the list, with an average yield of 24.1 bushels of grain per acre. In determining the yields per acre, 60 pounds was taken as the standard for each variety

of grain, even though the Emmer usually weighs only about 44 pounds per measured bushel. In threshing the Emmer, the heads break up into sections, and there is not a separation of chaff and kernel. The threshed grain, therefore, contains about 22 per cent. of chaff. It will be understood by this, that, although there are 24.1 bushels per acre credited to the Emmer in the table of results, still there is in reality only about 18.8 bushels of the pure grain, less the chaff. Even this yield is about two and a third bushels per acre greater than the average yield of grain produced by the Wild Goose variety. The Wild Goose spring wheat is grown largely for export to France and Italy for the manufacture of Macaroni, and the price for this variety has been usually good within the past few years. The Herison Bearded and the Blue Democrat are the two varieties grown more specially for the production of flour. All the varieties of spring wheats gave comparatively low results in the co-operative experiments of the past year.

Buckwheat. In 1899 and again in 1900, three varieties of buckwheat were distributed for experimental purposes. In 1901, however, only two varieties of buckwheat were used for the co-operative tests. Although the Japanese variety gave an average of 6.3 bushels more than the Silver Hull variety, still it will be seen from the figures given in the table that the Silver Hull was as popular among the experimenters as the Japanese variety. In taking the average results over Ontario for three years of these two varieties, it is found that the Japanese produced 2 bushels per acre more than the Silver Hull variety.

Peas. Previous to 1900, there was only one experiment with peas, but in the spring of that year it was thought advisable to make two distinct experiments. Therefore, three large yielding varieties were selected for one experiment irrespective of their weevil (Bruchus pisi) resisting qualities, and two varieties were selected for another experiment, these having been comparatively free from the ravages of the pea weevil in the experiments at the College. In 1901, a somewhat similar arrangement was made, with the exception that in the experiment with three varieties, one weevil-proof variety was included. As the result of placing these two experiments on the list, nearly all experimenters who asked for the large yielding varieties were located in the Northern part of Ontario, where the pea weevil does but little damage, while nearly all those who applied for the bug-proof varieties were those located in the Southern part of Ontario, where the pea weevil has been doing so much serious damage of late. In the results for 1900 it was found that the Grass peas, and in the results for 1901 it was found that the Grass peas and the Egyptian peas, or Coffee peas, were entirely free from the ravages of the pea weevil. We have found in our own experiments at Guelph that both the Grass peas and the Egyptian peas have been entirely free from the injuries of the weevil. The Egyptian pea is known under a good many different names, such as the Brazilian Coffee Pea, Chick pea, Idaho pea. New Gipsy pea, etc., the scientific name being Cicer arietinum. The Grass peas gave 2.7 bushels per acre more than the Egyptian peas in the results for 1901. The Egyptian variety is only suitable for rich land, but the Grass peas do very well on an average soil as well as on a rich soil.

Soy, Soja, or Japanese Beans. The Soy bean is a leguminous plant, native of Japan and China, and ranks very high in valuable food constituents. The plants grow upright, branch considerably, and frequently drop their leaves by the time the seed is ripened. The Soy beans are used for green fodder, silage, hay, pasture, and as a soil renovator. The grain, which is exceedingly rich, is used as a food for live stock. The beans have been used for the food of man since early times in Japan, and more recently in European countries. They are not generally used as a food by themselves, but are made into different complex forms, of which five are quite common among the Japanese people. Some of the leading varieties of the Soy beans have now been distributed throughout Ontario for three years in succession for co-operative experiments, and the results have been quite satisfactory. In 1899 and in 1900 the Medium Green, American Coffee Berry, and Extra Early Dwarf were the three varieties distributed. The average results show that the Medium Green variety gave the largest yield of grain in each of the two years. In 1901, only two varieties were distributed, the Medium Green for the

third time, and the Early Yellow variety for the first time. In the average results of thirteen experiments in 1901, the Early Yellow variety produced 3.3 bushels of grain per acre more than the Medium Green. The Early Yellow variety usually ripens well, and is one of the very best varieties of the Soy beans for the production of grain. For the production of green fodder or for silage, however, the Medium Green is likely to give better satisfaction, owing to its more luxuriant growth and greater development of leaf. In those parts of Ontario where the pea weevil is becoming so abundant as to practically ruin the pea crop, the Soy bean might be grown to great advantage.

Corn for Grain. In each of the past two years different varieties of corn have been distributed and tested throughout Ontario from the standpoint of grain production. Each experimenter was asked to weigh the total crop of each variety and then to husk, dry, thresh, and weigh separately the grain produced by each kind of corn. Two varieties of flint and one variety of early dent were distributed in each of the two years. The North Star Yellow Dent corn made a very high record in the average results of each year's co-operative tests, producing an average of 59.9 bushels of grain per acre in 1900, and 48.3 bushels per acre in 1901. The North Star Yellow Dent variety produced an average yield of corn which was 11.4 bushels per acre greater than that of the Comptons' Early in 1900, and which was 4.7 bushels per acre more than Compton's Early in 1901. Combining the two year's experiments, we find that the varieties stand in the following order in their yield of grain per acre: 1. North Star Yellow Dent. 2. King Phillip. 3. Salzer's North Dakota. 4. Compton's Early.

Winter Wheat. The results of the co-operative experiments with winter wheat were reported as soon as possible after the crop was harvested, in order that the information might prove of service before the time of sowing wheat last autumn.

Root Crops.

Experiments.	Varieties.	Comparative value.	Yield of Roots per acre. (tons)
10 Mangels (6 tests)	Evans' Improved Mammoth Sawlog	100	40.04
	Carter's Yellow Intermediate	87	29 27
	Carter's Warden Yellow Globe	60	24 66
11. Sugar Beets (15 tests)	New Danish Improved	100	27 30
	Klein Wanzlebener	50	22.26
12. Swedish Turnips (5 tests)	Kangaroo	82	28.26
	Sutton's Magnum Bonum	100	27.47
	Hartley's Bronze Top	82	25.91
13. Kohl Rabi and Fall Turnips. (2 tests)	Cow Horn Turnip	100	22.40
	Jersey Navet Turnip	67	14 80
	Early W. Vienna Kohl Rabi	33	9.20
14. Parsnips and Carrots (7 tests)	Bruce's Mammoth Intermediate Carrot	100	30 67
	Half Long White Carrot	79	28 49
	Improved Half Long Parsnip	50	19.31

There were five distinct experiments with root crops in 1901, and from two to fifteen good reports of successfully conducted tests were received for each experiment.

Mangels. For the experiment with mangels, the varieties which had given the largest yields per acre in the long red, the intermediate, and the globe classes were distributed for co-operative experiments. The Evans' Improved Mammoth Saw Log variety, which has given high results both at the Agricultural College and in the co-operative experiments over Ontario in former years, stands at the head of the list with an average of 40 tons per acre. This variety was quite popular among the experimenters. The average yield of the Evans' Improved Mammoth Sawlog in 1899 was 31.8 tons, and in 1900 was 33.6 tons per acre.

Sugar Beets for Feeding Purposes. Previous to 1900, one variety of sugar beets was included in the experiment with mangels, but it was thought advisable in 1900 to make a distinct experiment, and, therefore, two varieties from among some thirteen different kinds which had been tested at the Agricultural College were selected for the co-operative tests. For that year, the Danish Improved and the White Silesian were used, and the results show that the yield per acre of the two varieties was practically the same, but that the Danish Improved was more popular than the White Silesian in the estimation of the experimenters. In 1901, the Danish Improved and the Klein Wanzlebener were the two varieties included in the co-operative tests. The Klein Wanzlebener is a variety that is very rich in sugar, and is the one which has been used in the tests over Ontario in growing beets to be analyzed for sugar purposes. These two varieties in the Union experiments for 1901 were grown for agricultural purposes. The roots were grown in rows 25 inches apart, and the plants were thinned to a distance of 10 inches apart in the rows. In the average of fifteen tests, the New Danish Improved gave 5 tons per acre more than the Klein Wanzlebener. The last named variety, however, gave an average of 7 tons per acre more than is usually considered a very good yield of this variety when grown strictly for sugar production.

Swedish Turnips. The results of the experiments with Swedish Turnips for 1901 were somewhat different from those of 1900. The Sutton's Magnum Bonum, which occupies second place in 1901, came first in yield of roots per acre in 1900. In the average of the two year's results, the Sutton's Magnum Bonum gave a little higher yield per acre than either the Kangaroo or the Hartley's Bronze Top.

Kohl Rabi and Fall Turnips. Kohl Rabi was sent out for co-operative experiments in 1901 for the first time. This crop is used for culinary purposes and also as a stock food in some parts of Great Britain. The cultivation suitable for Kohl Rabi is very similar to that necessary in the growing of turnips. In the average results for 1901, the Cow Horn turnip gave decidedly the best results.

Parsnips and Carrots. Previous to 1901, three varieties of carrots were used for this experiment, but in the spring of the past year, it was decided to use, along with two varieties of carrots, a variety of parsnips which has given us the best results at the College. The Bruce's Mammoth Intermediate Carrot was distributed in 1901 for the first time, and surpassed the Pearce's Half Long White variety in yield of roots per acre. It will be remembered that the Pearce's Half Long White carrot has made high records in the co-operative experiments of past years.

FORAGE, FODDER, SILAGE AND HAY CROPS.

Experiments.	Varieties.	Comparative value.	Yield of Whole Crop per acre (tons.)
15. Fodder Corn (10 tests.)	Mastodon Dent	96	18 7
	Wisconsin Earliest White Dent	100	15.3
	North Star Yellow Dent	96	13 7
16. Millet (2 tests.)	Japanese Panicle	100	12.7
	Japanese Barnyard	88	11 9
	Hungarian	38	9.7
17. Sorghum (3 tests.)	Early Amber	100	10.1
	Millo Maize	50	9 9
	Kaffir Corn	50	6 8
18. Grass Peas and Vetches. (4 tests.)	Hairy Vetch	100	7 1
	Common Vetch	80	5.0
	Grass Pea	60	4 7

FORAGE, FODDER, SILAGE AND HAY CROP.—(*Con.*)

Experiment.	Varieties.	Second years crop. Tons of Green Clover per acre. 6 tests.	Second years' crop. Tons of dry hay per acre. 9 tests.
20. Clover	Mammoth Red	7.3	4.0
	Common Red	6.0	2.1
	Alsike	5.6	2.6

Experiment.	Varieties.	Average height about six months after seeding, 2 tests. (inches.)	Second years' crop, tons of dry hay per acre. 1 test.
21. Perennial Crops	Lucerne	10.5	4.4
	Sainfoin	12.5	1.9
	Burnet	11.0	1.4

Experiment.	Varieties.	Second season's crop. Tons of hay per acre. 7 tests.	3rd and 4th seasons' crop. Tons of hay per acre. 4 tests.
22. Grasses	Tall Oat Grass	2.8	3.1
	Timothy	2.7	1.8
	Orchard Grass	1.9	1.6
	Meadow Fescue	2.2	1.5

There were in all eight distinct experiments with forage, fodder, silage, and hay crops conducted throughout Ontario in 1901.

Fodder Corn. The Mastodon Dent has been found to be one of the best silage corns for the early soils in Southern Ontario. The Wisconsin Earliest White Dent has given excellent satisfaction as a silage corn in central Ontario, and the North Star Yellow Dent variety appears to be very well suited as a silage corn for many districts of Northern Ontario. Although there was a considerable amount of difference in the average yield per acre in the tests of the three varieties of corn, it will be seen that the three varieties were about equal in popularity.

Millet. The Japanese Panicle millet has now headed the list in the co-operative experiments over Ontario for three years in succession, except in 1900, when the yield of the Japanese Barnyard Millet was the same as that of the Japanese Panicle variety.

Sorghum. Although a large number of varieties of sorghum have been under experiment for several years at the Agricultural College, no co-operative experiment was conducted with different varieties of sorghum until 1901. Although the Early Amber Sugar Cane produced only one-fifth of a ton per acre more than the Millo Maize, the Sugar Cane was decidedly the most popular among the experimenters.

Grass Peas and Vetches. The Hairy Vetches, Common Vetches, and Grass peas are all leguminous crops, and, therefore, like clover and peas, are valuable as nitrogen gatherers. These varieties have been distributed for co-operative experiments for three years in succession, and the Hairy vetches have given the largest yield of green crop per acre in each of the three years. The Hairy vetches surpassed the Common vetches in yield of green crop by 2.1 tons per acre in 1899, nearly 1 ton per acre in 1900,

and 2.1 tons per acre in 1901. It will be seen that the Grass peas are not only valuable for grain production by their being proof against the weevil, but they are a good variety for green fodder purposes.

Rape and Kale. The Dwarf Essex Rape and two varieties of Kale were distributed in 1901 for co-operative experiments, but no satisfactory reports of carefully conducted experiments were received. The Dwarf Essex variety of Rape is the one which has given the best satisfaction at the Agricultural College.

Clover. The average results for the clover as given in the table here presented is for the first crop in each year, the second crop of clover not being included. It will be seen from the average yield of the first cutting that the Mammoth Red Clover has given decidedly the largest yield of green crop and of hay per acre.

Sainfoin, Lucerne, and Mammoth Red Clover. An additional experiment was added to the list in 1900, which included three perennial legumes. We hope to be enabled to present some valuable results of this experiment in future reports.

Grasses. The results given for the different varieties of Grasses are for the second, third, and fourth season after the seed had been sown. No second crop in any one season is included in the average results here given. Of the four different grasses under test, the Tall Oat Grass has produced the largest crop per acre.

CULINARY CROPS.

Experiment.	Varieties of Beans.	Comparative value.	Yield per acre.	
			Straw. (tons.)	Grain. (bushels.)
23. Beans (10 tests.)	Marrowfat	100	2.1	26.7
	Medium or Navy	88	2.1	25.5

Experiment.	Varieties of Sweet Corn.	Table quality.	Comparative number of ears.	Number of days until ready for table use.
24. Sweet Corn (27 tests.)	Mammoth White Cory	100	93	86
	Country Gentleman	85	100	99
	Kendal's Early Giant	80	85	85

Two experiments were conducted in 1900 and again in 1901 with culinary crops.

Field Beans. Ten good reports were received in the autumn of 1901, giving the comparative results of the Marrowfat and the Medium or Navy varieties of beans. The Medium or Navy variety did not give as large a yield in comparison with the Marrowfat variety as it usually does. In the majority of experiments, both at the College and throughout Ontario, the Medium or Navy beans have yielded a little more than the Marrowfat variety.

Sweet Corn. All three varieties of sweet corn were quite popular among the experimenters. The Kendel's Early Giant proved to be slightly the earliest, the Country Gentleman gave the largest number of ears, and the Mammoth White Cory was the most popular of the three varieties. These are all good varieties for the production of green corn for table use.

Fertilizer Experiments.

Fertilizer.	Quantity per acre fertilizer used.	Bushels of oats per acre, 5 years, 74 tests.	Average yield per acre.					
			Tons of mangels.		Corn per acre.			
					Total crop (tons).		Ears (tons).	
			1901, 5 tests.	Average 5 years, 41 tests	1901, 2 tests.	Average 5 yrs., 40 tests.	1901, 2 tests.	Average 5 yrs., 35 tests.
	lbs.	bus.						
No fertilizer	none.	38.9	22.52	20.58	10.36	8.1	2.06	2.96
Nitrate of soda	160.0	46.3	35.32	26.54	10.88	9.1	2.42	3.30
Muriate of potash	160.0	43.8	28.86	24.55	10.92	9.1	2.18	3.32
Superphosphate	320.0	43.6	27.33	24.20	10.88	8.9	2.18	3.32
Mixed fertilizer	213.3	48.7	34.09	25.37	10.88	9.1	2.32	3.40

Note.—The cost price of the fertilizers was between three and four dollars per acre for the quantities used in these tests.

The superphosphate and the muriate of potash were applied to the land at the time of planting, and the nitrate of soda at the time that the plants were about three inches high. The mixed fertilizer consisted of one part nitrate of soda, one part muriate of potash, and two parts of superphosphate by weight.

Fertilizers With Mangels and Corn. Different fertilizers were used on both mangels and corn crops in connection with the co-operative experiments of the past year. As this experiment has been conducted on somewhat similar lines for ten years in succession, we not only present the results for the past year, but also the average results for fertilizers used with oats, mangels, and corn, each for five years in succession. The results of this experiment, as presented in the table here given, are worthy of careful study.

Miscellaneous Experiments.

Growing potatoes on the level and in hills.

Experiment.	Method of Cultivation.	Comparative value.	Yield per acre.	
			Percentage marketable.	Whole crop. (Bush.)
27. Potatoes, 45 tests ..	Potatoes grown on level	89	87	197.8
	Potatoes grown in hills	100	88	189.3

Planting potatoes the same day and five days after being cut.

Experiment.	Time of planting.	Comparative value.	Percentage of crop marketable.	Yield of whole crop per acre. (Bush.)
28. Potatoes, 11 tests ..	Potatoes planted immediately after cutting	100	85	120.1
	Potatoes planted five days after cutting ..	67	84	111.8

Planting cut potatoes which have and have not been coated with land plaster.

Experiment.	Treatment of cut seed.	Comparative value.	Percentage of crop marketable.	Yield of whole crop per acre. (Bush.)
29. Potatoes, 15 tests ..	Cut potatoes coated with land plaster....	100	76	190.5
	Cut potatoes not coated with land plaster	76	77	176.1

Planting corn in rows and in squares.

Experiment.	Method of planting.	Comparative value.	Yield per acre.	
			Husked ears. (Tons.)	Whole crop. (Tons.)
30. Corn, 7 tests	Corn planted in squares or hills	100	3.7	11.5
	Corn planted in rows or drills.....	64	3.7	10.4

Growing Potatoes on the Level and in Hills. A co-operative experiment to test the comparative results from growing potatoes on the level and in hills was conducted over Ontario in 1901 for the first time. In the average results of forty-five full reports of carefully conducted experiments, it is found that the potatoes which were grown on the level gave a total yield per acre of 16½ bushels more than those grown in hills. These results are very similar to the results obtained at the College in testing the two methods of cultivation. The experiment will likely be repeated another year.

Planting Potatoes the Same Day and Five Days After Being Cut. This experiment has been conducted for several years at the Agricultural College and for five years over Ontario, and the average results have been very similar in all experiments. As a rule, the potatoes which have been cut and planted on the same day have given from 10 to 20 bushels per acre more than those which have been cut and planted from four to six days after being cut, the average for the five years over Ontario being about 17 bushels per acre in favor of immediate planting.

Planting Cut Potatoes which have and which have not Been Coated over with Land Plaster. This experiment has now been conducted throughout Ontario for two years in succession. The average results show that the potatoes which were sprinkled with land plaster gave an increase of 16.4 bushels per acre in 1900, and an increase of 14.4 bushels per acre in 1901 over those on which no land plaster was used. This experiment has also been conducted for five years at the Agricultural College. It was found in the College experiments that cut potatoes which were coated with land plaster also gave better results than those on which no land plaster was used.

Planting Corn in Rows and in Squares. An experiment has now been conducted over Ontario for three years in succession, in which corn has been planted in rows three inches apart, and, in comparison with this, corn has been planted in squares or hills three inches apart both ways. Exactly the same amount of corn was used for each method. Flat cultivation was used throughout, and the same amount of cultivation was given to each method of seeding. The corn which was planted in squares, or "hills," surpassed the corn which was planted in rows, or drills, in total yield per acre by 1.2 tons in 1899, 1.6 tons in 1900, and 1.1 tons in 1901. In yield of ears per acre, the squares surpassed the rows by ½ ton per acre in 1899, and ⅕ ton per acre in 1900, but the results were equal in this respect in the average tests for 1901. These results throughout are in favor of planting corn in hills as compared with drills.

Q. : What is the weight per measured bushel of the Siberian oats ?

C. A. Zavitz : The average weight per measured bushel of the Siberian oats, as grown at the College for the past ten years, is about 36 pounds.

Q. : You mentioned that the Siberian oats gave about 2 bushels per acre more than the American Banner in 1901, and about 2½ bushels per acre more than the American Banner in 1900. Do some of the farmers use other varieties than the Banner as a basis of comparison ?

C. A. Zavitz : Yes, nearly all the experimenters sowed an extra plot with the best variety which they have been growing in the past, as was advised in the instructions. In summarizing the results, we find that the best variety which the Union distributed gave upwards of 5 bushels per acre more than the best varieties which were grown on the farms on which the experiments were conducted.

W. K. Farlinger : Conditions vary in different localities. The variety of oats which give the best results on high-rolling land might not give the best results on the level land.

C. A. Zavitz : That is true, and hence the great value of the local experiments, which will show better than any other way which are the best varieties for the different conditions of soil and locality. We do not expect that the varieties will be equally serviceable under all conditions. In selecting varieties for distribution, one of the chief objects is to combine in those varieties various characteristics, so that one or the other might prove very serviceable on any soil, and we naturally expect that the variety which gives the best results on one soil will be surpassed by another variety on a soil entirely different.

Q. : What variety of oats would do best for sowing with barley for grain production ?

C. A. Zavitz : If you take a variety of heavy yielding oats which is medium in reaching maturity, such as the Siberian, you would need to sow with them a late variety of barley, such as the Chevalier two-rowed, which makes an excellent mixture. If you take a medium ripening barley, however, such as the Mandscheuri, it is necessary to secure a very early ripening oat, such as the Daubeney, in order that they will ripen at the same time. Both of the mixtures here mentioned have given splendid results at the College.

Q. : How does the yield of the Mandscheuri barley compare with that of the Black Hulless variety ?

C. A. Zavitz : In the average of eight or ten years' experiments, the Mandscheuri barley has produced about one-third more pounds per acre than the Black Hulless variety.

J. H. Cole : The Hessian Fly is causing serious havoc in our barley crops in my section. Have you found much difference in the different varieties in resisting the attacks of the Hessian fly ?

C. A. Zavitz : We had no Hessian fly in the barley until the past summer. Even then there was not enough of the fly for us to make any determinations as to the comparative value of the different varieties in resisting the ravages of the Hessian fly.

Q. : How do the Grass peas compare with the Golden Vine as a nitrogen gatherer ?

C. A. Zavitz : The Grass pea is a leguminous plant, and I think would be about the same as the Golden Vine variety in drawing nitrogen from the atmosphere.

Mr. Wilson : The Grass pea ripened more evenly in my section than the other varieties.

C. A. Zavitz : On uniform land the Grass peas are usually pretty uniform in their growth, but on land which is uneven there are sometimes difficulties in parts of the field ripening earlier than other parts. The Grass pea is rather slow in reaching maturity.

Q. : At what time do you plant the Soy beans ?

C. A. Zavitz : We usually plant the Soy beans about the 5th of May.

Q. : How are the Soy beans usually planted ?

C. A. Zavitz: The seed should be sown in rows and the crop cultivated. The Soy bean is being used considerably in some of the Eastern States by dairymen who wish to secure very rich food for their animals. It is also beginning to be grown quite extensively in some of the Western States, particularly Kansas. The crop will serve admirably as a substitute for peas in those sections where the pea weevil is doing so much damage.

Dr. Saunders: Our experience with Japanese Millet is that the stems are not equal to other millets for feeding purposes.

E. M. Zavitz, Coldstream, Ont.: We have grown this Japanese millet for several years, and would not go back to the other varieties of millet, because we get twice the quantity of fodder, and more than twice the quantity of grain. After the Japanese millet ripens and we thresh it for the seed, the farm stock will eat the straw with relish.

Q.: How much grain do you get per acre?

E. M. Zavitz: From 25 to 30 bushels on gravelly soil.

A Member: We get about the same amount in the West.

A Member: I find the Japanese millet does well on poor soil, but I grew it and cultivated it like corn, and it is well adapted to a light sandy soil.

Mr. Glendinning: I tried to grow the Japanese millet on very rich land, but did not meet with good success.

Q.: How does Amber Sugar cane compare with corn for feeding purposes and for the silo?

C. A. Zavitz: It is somewhat richer, but I have had no experience in making silage from Sugar Cane.

Dr. Saunders: We tried sorghum in the silo, but with us it has always blackened. In some seasons, it will give a good crop, but our experience with it was unfavorable in the Ottawa District. It will not compare favorably with corn in a good year. We have had no success in keeping it in the silo. Perhaps it did not ripen well; that has a great deal to do with the keeping quality.

Mr. Drummond, Ontario Co.: We have had three years' experience with it in the silo. This year we had twenty tons on top of the corn. We find it to be very successful, and that it keeps in the silo about as well as corn.

Dr. Saunders: Was it the same variety here referred to?

Mr. Drummond: Yes, the Amber Sugar Cane. We had 50 per cent. more by weight than from corn. Our experience is that it keeps about as well as corn, but the sugar cane silage does not make quite as good food as the corn silage.

Mr. Fixter: We fed sugar cane to pigs last year with very good results.

T. H. Mason: I know of a farmer who has fed it to horses very successfully.

A Member: A man near me had nine acres of sugar cane. He made syrup out of it. Six acres yielded 117 gallons of molasses to the acre.

Q.: Last year we saw something about cattle being poisoned on sorghum.

C. A. Zavitz: We heard of a little trouble from pasturing sorghum in the Western States last year. I made enquiries regarding it, and from what I could glean there need not be much fear on this account. Some farmers in the West have pastured sorghum for several years with excellent results. Sorghum can be used for many purposes. It can be pastured, used as a green or a dry fodder, put in the silo, ripened for the grain, or used for the production of molasses.

Q.: Is the grain of equal value with other grains for feeding?

C. A. Zavitz: The grain is quite starchy, but I think would be nearly equal to corn for feeding purposes.

Mr. Van Adam: Cow peas grow well with sorghum and give good results in the silo.

Dr. Saunders: The Awnless Brome Grass is a wonderfully good grass for the Northwest, yielding about 3½ tons of hay to the acre at Indian Head. I do not know whether it would be as good for Ontario, but it has done very well at Ottawa.

C. A. Zavitz: We have grown the Awnless Brome Grass at the College for a number of years, but have not found that this Grass gives as good results as it seems to give in the West.

A Member: We have had it on our farm for 25 years and wish we could get rid of it.

Dr. Saunders: I do not think that there is much trouble in getting rid of it, if it is plowed at the right season. I saw an irrigated crop near Calgary that was running from 3 to 3½ tons per acre. It seems to succeed better in the West, under adverse conditions, than any grass we have ever tested.

Q.: Has the black sweet corn been tested?

C. A. Zavitz: The Black Mexican sweet corn has been grown at the Agricultural College for several years. It was also distributed as one of the three varieties for co-operative experiments in 1900. It is a very fine corn, of good flavor and very juicy. If the ears are taken when quite young, the black color does not show much.

Mr. Caston: Have you found very marked benefit from using fertilizers with mangels?

C. A. Zavitz: Taking the average of our experiments for five years over Ontario, we find that the use of 160 pounds of nitrate of soda per acre has increased the yield of mangels 6½ tons per acre. This is one of the most striking effects in connection with our fertilizer experiments. The cost of the 160 pounds of nitrate of soda per acre was about $3.80.

Dr. Saunders: The results of the co-operative experiments in growing potatoes on the level and in hills correspond very nearly with the results at Ottawa. We have given up growing our field potatoes in hills. Taking one year with another, the resutls were better from the level cultivation.

Mr. Fixter: At what stage was the hilling done?

C. A. Zavitz: The experimenters were allowed to hill the potatoes as they had been in the habit of hilling potatoes in previous years. No definite time being mentioned in the instruction sheets as to when the hilling was to be done.

Dr. Saunders: It has been a surprise to me for some years to know how small the average potato crops in Ontario are in comparison with the yields obtained at Ottawa. It seems to point to the fact that Ontario has not a very favorable climate for the production of potatoes. We have a good deal more moisture in the Ottawa valley than in many parts of Western Ontario. That may be the principal cause for the reason of the difference in the yields.

C. A. Zavitz: I think the large amount of moisture in the Ottawa valley has a good deal to do with the large yields of potatoes grown at Ottawa. I have noticed that several crops can be grown in the Ottawa valley better than in almost any other part of Ontario. For instance, I have found no place in Ontario where the Horse beans proved successful one year with another, except in two or three counties along the Ottawa valley, where the Horse beans usually give very good results.

Hon. John Dryden: In the experiment in planting potatoes immediately and five days after they were cut, how were the cut potatoes kept during the five days?

C. A. Zavitz: We thought it advisable to give the experimenters no definite instructions along this line, but allow each to keep the cut potatoes as he thought best. Each experimenter was requested to state in his report the number of hills of potatoes which grew from each lot of potatoes planted. Unless the number of hills were practically the same in both cases, the results were not used for the summary report which is here presented.

Dr. Saunders: I take the greatest interest in this Association. I think it one of the best in existence in securing valuable information. We are all interested along the same lines, and I wish to say that if any one here would like the reports from Ottawa, they could get them, free of charge. I think they will find many things in the reports that will be useful to the people of Ontario.

C. A. Zavitz: We all appreciate very much Dr. Saunders' remarks regarding the Union, and also his liberality in offering to supply the ex-students and other farmers from over Ontario who are here assembled with the reports of the Dominion Experimental Farm. We all want to secure the best information we can get from different

sources, and I would advise all to get all the reports issued at Ottawa, and make the best use possible of the results of the experiments there presented.

While much has been said regarding the value to the Province of the results of the co-operative experiments, I hope none will get the impression that the financial results of the co-operative work are the only benefits obtained therefrom. I consider that the educational influences of these co-operative experiments are even greater than the influences of the experiments from a financial standpoint. The educational training in the carrying out of these experiments has a very beneficial influence not only upon the experimenters themselves, but also upon their families, their neighbors, and their fellow-farmers generally. People find out that by a little work and care in conducting experiments along definite lines, they obtain a special training and definite information which cannot be obtained in any other way, and which is of the utmost importance to them in their future work. In the sixteen years that we have been conducting the co-operative experiments in agriculture throughout Ontario, and during which time I have been closely connected with this work, I have been greatly pleased with the interest which has been taken in this work by the farmers generally, some of whom undoubtedly took but little interest at first, but afterwards developed into careful and enthusiastic experimenters, and obtained results which were of great value not only to themselves but also to others. On behalf of the Union, I wish to thank the experimenters most heartily for the excellent work which they have done for the good of themselves and for the Province generally.

REPORT ON CO-OPERATIVE EXPERIMENTS WITH SMALL FRUITS.

By Prof. H. L. Hutt, Ontario Agricultural College, Guelph.

The wonderful progress that has been made in fruit growing in this country of recent years is a subject well worthy of note. The time is still fresh in the memory of many of our people when the pioneer plantings of any considerable extent were made. These were naturally in the older sections, bordering the shores of Lakes Ontario and Erie, and along the St. Lawrence and Niagara Rivers. In the newer and interior sections the people depended upon the wild fruit, found in more or less abundance, or, failing that, they went without it.

The first plantings were mostly apple and pear trees, but after a time it was found that the more tender fruits, even grapes and peaches, could be grown to perfection in the Southern sections. Plantings of all kinds of fruits became general, and they spread into all parts of the country. Now this might well be called a land of "corn and wine," of "milk and honey," of "peaches and cream" ; in fact, a hundred more appropriate names than the land of the "Lady of the Snows."

The display made this year at the great Pan-American Exposition, and also at the Glasgow Exhibition, has helped to open the eyes of the world at large to our capabilities in the way of producing a great variety of fruits of superior excellence.

At the Pan-American, our exhibit was pronounced first in quality and second only to New York in variety.

We now produce annually over three million barrels of apples in this Province alone, and our shipments to the Old Country markets are assuming enormous proportions. Efforts are now being made to perfect the means of transportation, that we may place on British markets in good condition our more luscious tender fruits. One evening last fall I helped load at the Grimsby station two carloads of Bartlett pears, which were being shipped to the Glasgow market. Several other car-loads were shipped from the same place this season, and these are only a beginning of what will be sent as soon as complete systems of cold storage can be secured on both railroads and ocean steamships.

The fruit industry in Ontario is now one of the most important industries of the Province, and it is growing fast. The Government has recognized its importance, and has established fourteen Fruit Experiment Stations in various parts of the Province, to enable growers to find out what are the best varieties of the different kinds of fruits for each particular section, that they may waste no time and expense in growing inferior or worthless varieties. These stations are doing good work, and the results of these tests are giving fruit growers just the information needed.

The Experimental Union also has been helping on the work by introducing a system of co-operative experiments with small fruits. This work was begun eight years ago with sixty experimenters, and every year since then it has been steadily increasing, until now we have on our books the names of about one thousand experimenters located in different parts of the Province, who have been carrying on these tests with small fruits on their own farms. Our co-operative experiments are helping to encourage the growing of small fruits on many farms throughout the country, where they have not been grown before. During the time we have been engaged in this work, we have distributed 2,256 currant bushes; 3,220 gooseberry bushes; 3,600 blackberry plants; 4,440 black raspberry plants; 4,440 red and white raspberry plants; and 25,008 strawberry plants, or a total of 42,964 plants. This large number of plants of the leading varieties distributed in small lots all over the Province is having its influence in encouraging the growing of fruits by farmers generally, and we hope it will hasten the time when all of our people will know the satisfaction of having a good supply of fruit for home use throughout the year.

The following circular, sent out early in the spring of the present year, gives the list of experiments, as offered to experimenters this year :

Co-Operative Experiments in Horticulture.

Dear Sir,—Through the agency of the Experimental Union, arrangements have again been made for furnishing plants for a number of co-operative experiments with small fruits.

The varieties for the several experiments offered this year are as follows :

I. Strawberries—Clyde, Haverland, Saunders, and Van Deman—12 plants of each.
II. Raspberries—Cuthbert, Golden Queen, Marlboro', and Shaffer—6 plants of each.
III. Black Raspberries—Gregg, Hilborn, Palmer and Souhegan—6 plants each.
IV. Blackberries—Agawam, Gainor, Kittatinny, and Snyder—6 plants of each.
V. Currants—Fay, Raby Castle, Victoria, and White Grape—3 plants of each.
VI. Gooseberries—Downing, Pearl, Red Jacket, and Whitesmith—3 plants of each.

Each person wishing to join in the work, may do so by choosing one of the experiments, and signing the agreement contained in the accompanying form of application. The experiment selected may be indicated by number. It is well for each applicant to make a second choice, in case he may be too late for the first. The supply being limited, plants will be furnished in the order in which the applications are received ; those who apply promptly will be most likely to receive what is asked for.

Instructions for conducting the tests will be sent to each experimenter before the plants are mailed, and blank forms will be furnished from year to year, upon which to report the results. All will be furnished free of charge, and the plants and produce become the property of the experimenter. In return, we expect that each experimenter will follow the instructions given, and will report each year, as requested, upon the growth and yield of each variety under test.

These plants are purchased from nurserymen at considerable expense, and as the funds at our disposal for this purpose are limited we can seldom furnish plants to more than half of those applying for them. We would like, therefore, that they go to those only who will make an honest effort to make the experiment a success, and we trust no one will apply for plants unless he is prepared to make such an effort, and will report the results as requested.

Trusting that your interest in the work may lead you to become a successful experimenter,

H. L. Hutt.
Director of Co-operative Experiments in Horticulture.

The following form of application, which is sent with the circular offering plants for testing, states the terms upon which the plants are sent out. It is in reality an agreement on the part of the experimenter to follow the directions given and report results :

Application for Plants for Co-Operative Experiments in Horticulture.

Dear Sir,—Kindly forward to me the plants for the experiment which I have selected as indicated below. If my application is received in time to entitle me to them, I agree

1. To conduct the experiment according to directions furnished.
2. To look after the plants and exercise care and accuracy in reporting the results.
3. To report upon the growth and yield of each variety at the end of each season as requested.

Name... .. ..
Post Office.. . . ..
County.. ... .
Experiment chosen 1st choice.. ... ...
(Indicate by Number) 2nd choice. ... ...

(This sheet, when filled out and returned by mail, will require 2c. postage whether the envelope is sealed or not.)

As soon as the list of experimenters for the year could be made up, the following circular was sent out informing applicants that they might expect the plants in due time, and giving general directions for conducting the experiments. Accompanying this was a sheet giving special cultural directions for the particular experiment chosen :

Dear Sir,—I am pleased to inform you that your application for plants for co-operative testing was duly received, and that the plants will be forwarded to you as soon as the weather is suitable for planting. If they cannot be planted as soon as they are received they should be unpacked, so that the roots may be spread out and buried in moist earth ; but the sooner they can be permanently planted, the better.

The soil upon which they are to be planted should be as uniform as possible, so that all varieties may have an equal chance.

As soon as planted, each variety should be carefully labelled. Stout wooden stakes painted white, written on plainly with a lead pencil, and driven firmly into the ground answer the purpose well. It is advisable, also, to make a record of the planting in a notebook, in case a label should at any time be lost.

I trust you will follow the directions carefully, and that you will not allow poultry or trespassers to interfere with the fruit. The weight of the entire crop from each variety is one of the most important items desired in your annual report; and, in order that this may be given accurately, it will be necessary for you to carefully weigh and record each picking, so that the total yield of each variety may be reported at the end of each season. Blank forms will be mailed to you in due time each season, upon which to make such report.

The value of this experiment depends largely upon the attention given to it. I trust you will find it both interesting and profitable. From this small collection of plants you may, in time, by good management, propagate for yourself all the plants you wish, without interfering with the value of the experiment in the least.

Should you require any further information regarding the work, kindly let me know and I shall be pleased to give all the assistance possible.

The Strawberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of barnyard manure.,

2. Set the plants in rows, at least 4 ft. apart and about 18 inches apart in the row. If two or more varieties are planted in the same row, leave a space of at least 3 ft. between them to avoid mixing of the runners.

3. The best method of planting is to use a spade, thrusting it deeply into the ground, then pressing it backwards and forwards. Into the opening thus made, spread out the roots fan-shaped, and pack the soil firmly about them with the foot.

4. Give clean, thorough cultivation throughout the season, and never allow the soil to become crusted.

5. Pinch off all blossoms the first season, that the plants may make vigorous growth and not waste their energies trying to produce fruit.

6. Confine the runners of each variety to its own row, allowing them to form matted rows about a foot and a half wide. If any of the plants should die, place the runners of the adjoining plants so that they will fill up the spaces.

7. As soon as the ground is frozen in the fall, cover the whole plantation with two or three inches of strawy stable manure. When danger of frost is over in the spring, rake the coarsest of this covering off the plants and tread it down between the rows for a mulch. If it is not thick enough to keep down weeds and retain moisture, more may be added at any time in the spring.

8. To continue the experiment from year to year, a similar plantation should be set out each spring, taking a dozen new plants of each variety from the plots set out the year before. The old plots may be plowed up after the second crop is off.

9. Carefully weigh and record the weight of each picking from each variety, and report as soon as possible after the fruiting season.

The varieties of strawberries sent out last spring were: Clyde, Haverland, Saunders, and Van Deman.

These were sent to 116 experimenters, only one-half of whom have as yet reported. The majority of those reporting say that much difficulty was experienced this season in getting a good stand of plants. The best results come from the northern and eastern sections of the Province, where they had not the extreme drouth which prevailed in the southern and western sections.

The varieties sent out a year ago were Clyde, Haverland, Saunders, and Glen Mary. Thirty-five experimenters report this year on the yields obtained. In some places one variety has done best, and in other places near by another leads; but, on the whole, the Clyde has made the best showing. Haverland also did well, and is highly spoken of by many of the experimenters.

Each of the varieties has its good qualities, and they are all well worthy of a place in any collection for home use or market.

The Red Raspberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Plant in rows 5 or 6 feet apart, with plants 5 feet apart in the row

3. Give clean, thorough cultivation until about the beginning of August, and never allow the soil to become crusted.

4. Pinch off any blossoms which may form the first year, that the plants may not waste their energies trying to produce fruit.

5. Do not allow the varieties to become mixed by letting the suckers grow between the bushes.

6. In the fall, or early in the spring, cut out all old canes that have fruited, and leave about six of the strongest new canes to each bush. Shorten the ends of these to a uniform height, making the bushes uniform and symmetrical.

7. In northern localities, where winter protection is needed, bend down the canes late in the fall, and cover the tops with earth to keep them under the snow.

8. Should any spaces have to be filled, or should the experimenter wish to increase his stock of any of the varieties, it may readily be done by taking up the young suckers which spring up about the bushes. Shaffer is propagated by bending down and covering the tips of the new canes in August. They will make good plants by the next spring.

9. Carefully weigh and record the weight of each picking from each variety, and report as soon as possible after the fruiting season.

For this experiment, the varieties selected were Cuthbert, Golden Queen, Marlboro' and Shaffer. Thirty-five lots of plants were sent out last spring and twenty reports have been received this fall upon the growth of the plants. Nearly all report good success with the planting, most of them speak of the great vigor of growth of the Shaffer. Twenty-two experimenters report upon the yield of the same varieties sent out in previous years. Shaffer is conceded by nearly all to be the heaviest yielder of the lot. This is one of the purple varieties, a very desirable one for home use, but not such a favorite in the market as some of the lighter colored berries. Cuthbert comes second

in point of yield. This is a firm, bright red berry, that has long been known as the Queen of the market. The Golden Queen is much like the Cuthbert, except that the fruit is yellow. Marlboro' ranks last for yield, but it is the first to ripen its fruits. These four varieties cover the season well from early to late, and make an excellent selection for home use or market.

The Black Raspberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Plant in rows 5 or 6 feet apart, with plants 5 feet apart in the row.

3. Give clean, thorough cultivation until about the beginning of August, and never allow the soil to become crusted.

4. Pinch off any blossoms which may form the first year, that the plants may not waste their energies trying in produce fruit.

5. To make the bushes stout and stocky, pinch off the ends of the new canes during the early summer, when they are two or three feet high.

(In northern localities, where winter protection is needed, this should not be done, as the canes should grow long and slender, that they may be more easily laid down.)

6. In the fall, or early in the spring, cut out all old canes that have fruited, and leave about six of the strongest new canes to each bush. Shorten the ends of these to a uniform height, making the bushes uniform and symmetrical.

7. In northern localities, where winter protection is needed, bend down the canes late in the fall, and cover the tops with earth to keep them under the snow.

8. Should any spaces have to be filled, or should the experimenter wish to increase his stock of any of the varieties, it may readily be done by propagating new plants from the tips of the new canes, which should be bent down and covered with earth in August. They will make good plants by the next spring.

9. Carefully weigh and record the weight of each picking from each variety, and report as soon as possible after the fruiting season.

The varieties included in the Black raspberry test are Gregg, Hilborn, Palmer, and Souhegan. Thirty-five experimenters received plants this spring, and twenty-four report this fall upon them. On the whole, black raspberries have not lived so well as the reds, but most of the experimenters have some of all kinds living, and can easily propagate from these what more they need.

Twenty-two reported upon the fruiting of plants sent out in previous seasons. There is a good deal of difference in the results reported, but Hilborn and Palmer appear to have been the most productive.

To ascertain definitely just which is the best black cap for any particular section seems to be a difficult matter, as the varieties vary so much in different seasons. We have been testing about two dozen varieties at the College here during the past five years, and every year some new variety appears at the head of our list as having made the best yield. Last year Hilborn and Palmer were ahead, and this year it was Eureka and Gault.

The Blackberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Plant in rows 5 or 6 feet apart, with plants 5 feet apart in the row.

3. Give clean, thorough cultivation until about the beginning of August, and never allow the soil to become crusted.

4. Pinch off any blossoms which may form the first year, that the plants may not waste their energies trying to produce fruit.

5. To make the bushes stout and stocky, pinch off the ends of the new canes during the early summer, when they are two or three feet high.

(In northern localities, where winter protection is needed, this should not be done, as the canes should grow long and slender, that they may be more easily laid down.)

6. In the fall, or early in the spring, cut out all old canes that have fruited, and leave about six of the strongest new canes to each bush. Shorten the ends of these to a uniform height, making the bushes uniform and symmetrical.

7. In northern localities, where winter protection is needed, bend down the canes late in the fall, and cover the tops with earth to keep them under the snow.

8. Should any spaces have to be filled, or should the experimenter wish to increase his stock of any of the varieties, it may readily be done by taking up the young suckers which spring up about the bushes.

9. Carefully weigh and record the weight of each picking from each variety, and report as soon as possible after the fruiting season.

The varieties tested in the Blackberry Experiment were Agawam, Gainor, Kittatinny, and Snyder. Thirty-five experimenters received plants last spring and twenty report this spring on the success of their planting. A few lost one or more plants, but most of the experimenters report all plants living.

Fifteen reports have been received from the plants sent out previous years.

Blackberries are the least hardy of the bush fruits commonly grown in this country. In some sections, the plants were frozen to the ground last winter. The Snyder is reported as being the most hardy, but where the plants have suffered by winter killing, the Kittatinny has produced the largest yields and the finest berries.

The Currant Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Set plants five feet apart each way, in one or more rows, as convenient.

3. Give clean, thorough cultivation until about the first of August, and never allow the soil to become crusted.

4. Look out for currant worms on the lower parts of the bushes soon after the leaves are fully grown. They may be destroyed by spraying with Hellebore (1 oz. to 3 gallons of water), or Paris green (1 oz. to 10 gallons of water.)

5. Prune early every spring. A good method of pruning is to leave six inches to form the bush, then keep up a renewal of new wood by cutting out every year, two of the oldest branches, and allowing two strong new ones to take their place. Cut out all other new canes, and shorten back the new wood left nearly one-half.

6. Carefully weigh and record the weight of the crop from each variety, and report as soon as possible after the fruiting season.

The varieties of Currants in the Currant Experiment are Fay's Prolific, Raby Castle, Victoria, and White Grape. Plants were sent to thirty-eight experimenters last spring and thirty reports on the same have been received. With but one or two exceptions, all succeeded in getting every plant to live. This is a remarkably good record of planting among so many planters.

Thirty-one experimenters reported on the yield of the bushes set out in previous years. The honors for first place are pretty well divided among the four varieties ; but, on the whole, Fay's Prolific seems to be the favorite. White Grape has made a good showing, and is an excellent variety for home use ; but, like other white fruits, it does not have the demand in the market that the red varieties do.

The Gooseberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Set plants five feet apart each way, in one or more rows, as convenient.

3. Give clean, thorough cultivation until about the first of August, and never allow the soil to become crusted.

4. Look out for currant worms on the lower parts of the bushes soon after the leaves are fully grown. They may be destroyed by spraying with Hellebore (1 oz. to 3 gallons of water), or Paris green (1 oz. to 10 gallons of water.)

5. The English varieties—Industry and Whitesmith—are subject to mildew. This may to a great extent be prevented by spraying with potassium sulphide (1 oz. in two or 8 gallons of water). It should be applied early in the season, just as the buds are swelling, and five or six times afterwards, at intervals of ten days or two weeks.

6. Prune early every spring. A good method of pruning is to leave six branches to form the bush, then keep up a renewal of new wood by cutting out every year, two of the oldest branches, and allowing two strong new ones to take their place. Cut out all other new canes, and shorten back the new wood left nearly one-half.

7. Carefully weigh and record the weight of the crop from each variety, and report as soon as possible after the fruiting season.

For the Gooseberry Test the varieties selected were Downing, Pearl, Red Jacket and Whitesmith.

Fifty-two lots were sent out last spring, and thirty reports on these have been received this fall. The majority of the experimenters report very good success in planting, but quite a number lost one or more plants of Whitesmith. This is one of the English varieties, the plants of which are usualy imported from the Old Country, and thus lack the vitality and vigor of the American varieties.

Twenty-five experimenters report on the plants sent out previous to last year. By the majority Pearl and Downing are reported as the most productive, although Red Jacket has done well and has produced large berries.

Whitesmith bears the largest and finest berries, but this variety, like other English varieties, when grown in this country, is very subject to mildew.

In conclusion, I may repeat what I have said in former years, that is, the greatest value of this co-operative work is not in the brief summary presented at this annual meeting, but the greatest good naturally is obtained by the individual experimenters who carry on the experiments, and from the many reports sent in we have abundant evidence that the majority of the experimenters appreciate the work and are profiting by it.

Mr. McNeill: I agree with Prof. Hutt that there is great good in these experiments for the experimenters themselves, but I think this phase of it might be extended to the boys on the farm. If the fruit growers would endeavor to interest their small boys in conducting these experiments it would be a means of education not less valuable than that afforded at the high school. My own small boy is immensely interested in it, and knows more about fruit growing than he would have been able to gather by years of work in some other lines.

In the matter of planting strawberries I find it pays to wait a few days for favorable weather. The way for them to get a good start is to have cloudy weather for a day or two after planting. Rapid planting is also very desirable.

Mr. Sherrington: What Mr. McNeill says as to strawberry planting is correct. The plant has a small, fibrous root, and if it is exposed to the air and sun for a few minutes it becomes shrivelled and dried up, so that it is impossible to make the plant grow. The plants should be kept moist and shielded from the sun and air. I carry my plants in a sack that has been dipped in water. It is very important to press them firmly in the ground. After planting, the ground should be cultivated so that it will hold the moisture. It is, of course, important to cultivate throughout the season. There is room for much discussion on the planting of raspberries, and also as to the best varieties for different districts. Some of those sent to my district have been of no use at all for the market. Some are good for home use, but I think we should look more for the commercial berry, for that will be good for our own table also.

Mr. Robert Thompson (St. Catharines): As regards getting our small boys interested, unless we would give our small boys the fruit, there is not much use in asking them to look after the plants. As to market varieties, I think one of the chief objects in these experiments is to get fruit among farmers who have no fruit, and to encourage by every means the people in the back counties to grow more and more fruit. About the difficulty of getting the plants to the parties early in the spring I would suggest that some of the plants could be sent to the north in the previous fall and planted out, because they do not suffer from thawing and freezing as we do in the south.

Prof. Hutt: I agree with what Mr. Thompson suggests. We have followed the plan of sending out plants in the spring because that is the usual time for planting; but our experiments at the College have been in favor of fall planting for currants and gooseberries. Last year they were set out at the end of the first week of November and with very good results. I do not think this would succeed so well with black raspberries as with red. As to the time for planting strawberries, there is quite a difference of opinion. Our experience is that it is well to hold off plant-

ing in the spring till the ground is in good shape, and the plants begin to make new growth. We usually plant about the first week in May. We find that plants set out after a little growth has been made in the spring are most vigorous and we lose very few of them. We always cut back the tips of the roots of strawberry plants brought from a distance, and if the plants are at all dried, we soak them in water for a while, and in that way save most of the plants. We watch for cloudy, showery weather for planting. Strawberry plants need very careful handling, as they are more readily injured than other plants.

Q. Have you tried planting strawberries with only a surface cultivation in the spring? They say the ground does not dry out so rapidly.

Prof. Hutt: Our practice in preparing the ground for strawberries has been to plow in the fall, apply the manure and then rib it up. In the spring the ground is worked down as soon as it is dry enough. In that way we save soil moisture from the start. I would not advocate planting without plowing in the spring unless the soil is mellow enough for the spade to go straight down, so as to allow the roots to go straight down also.

Mr. Caston, Craighurst: I think every farmer should induce some of the younger members of his family to take an interest in the fruit experiments. Too many farmers are not growing any small fruits. As to strawberry planting, I find it an important thing to trim off the runners and the old rusty leaves before planting. Do not allow the plants to bear any fruit the first year, because they require all their vitality and energy to form good plants. In blackberries I would suggest that Prof. Hutt should add the Eldorado to his list of varieties for co-operative experiments, as it is good for the northern district. I would recommend that and the Agawam. They will stand a temperature of 25 below zero, and they yield an excellent crop of choice berries.

REPORT OF CO-OPERATIVE EXPERIMENTS WITH EGG PRESERVATIVES.

By W. R. Graham, B.S.A., Agricultural College, Guelph.

In our experiments this year our experience has been somewhat different to that of last year. This year there is a diversity of opinion among the experimenters as to which is the better preservative. The highest individual score was for eggs preserved in the lime water, but when we come to the general average the conclusions are not so favorable.

We sent out twenty-one different samples of preservatives, but up to this morning I have received but nine replies from parties who were able to successfully conduct the experiment. This is not a very large percentage, but the results are valuable so far as they go.

The first experiment of the series was conducted with one part of water-glass to five parts of water. I may say that water-glass, or sodium silicate, resembles extracted honey in appearance. There are two kinds, the American and the English. The American will allow an egg to sink when diluted with five times its own bulk of water, while the English must be diluted twelve times. From drug stores you usually purchase the American article, but if you purchase from soap factories you usually get the English water-glass. The latter you will have to dilute one to twelve or one to fifteen in order that the eggs may sink. Then, if the eggs are not more than twenty-four hours old they will sink, but if they are two or three days old they will not. With American water-glass one part of water-glass to seven parts of water will give the best general satisfaction.

The lime solution used in our experiments was made by slacking two pounds of ordinary fresh lime and adding to it one pound of salt. After stirring well, add four gallons of water. This is stirred and then allowed to settle. You afterwards pour off the liquor, which is used as the preservative. Pure lime-water is practically as good as

lime-water and salt. It is necessary to cover the jar in which the pickle is put. Where it is left open to the air and disturbed once or twice in the season, you will not get good results.

In our score cards for scoring the results of the experiments, we allowed fifty points or ten for each of the following: Flavor, density of white, toughness of yolk, beating qualities, and poaching qualities.

Where eggs were put up in ordinary salt, the evaporation was equal to 33 per cent. of the contents of the egg. Where the eggs were greased, this was reduced to 25 per cent. There is no evaporation of the egg with the water-glass or lime solution. Three per cent. of the eggs put up in salt were bad, but where the eggs were greased, there were none bad.

In the experiments with water-glass, one to five, the eggs scored 44 out of a possible 50. Where the water-glass was one to seven, the eggs scored 43.2 out of 50.

With the lime and salt solution, the eggs scored 40, and in the lime-water they scored 41.

The eggs put up in salt scored 37, and the greased egg put up in salt scored 38.

Three of the experimenters scored their eggs put up in the lime water higher than any others. This solution received the highest individual score. But two experimenters report their eggs very bad in that solution. Others report these eggs to be inferior to those preserved in water-glass. While this is a first-class pickle, a great deal seems to rest with the experimenter and the carefulness with which the experiment is conducted. At the College, the eggs kept in the lime solution in the house cellar turned out favorably in every respect, except that they had a slight flavor of lime. The eggs we had in the same solution in cold-storage were all bad and mouldy on the top. I do not know whether the dampness had anything to do with it, but the eggs in water-glass in cold-storage kept very well. I think it will be necessary to continue this experiment for four or five years if we are to reach definite conclusions, as it gives very variable results. This year the worst and the best results came from the same town. I notice that with experimenters who conducted experiments with lime solution both last year and this year, the results this year are better than last.

Q.: Have you tried oil with this solution?

Mr. Graham: Yes; but it did no better with me. The lime solution with me gave good satisfaction, except in the cold storage building, but these particular eggs were gathered from the egg waggon and not from our own department, which may have had something to do with it; but they stood the candle test before pickling, which is as far as we can tell. If you pickle eggs in July without first testing them in this way you will not have many good ones. In Gunn Bros.' establishment this year, with some of the July and August eggs, eight out of ten were more or less incubated. It is hardly possible for the egg dealer to supply eggs in any other condition during the hot weather, for if they are left for three or four hours in the hot sun, 90 per cent. will have started to hatch, and are no longer suitable for pickling. No pickle made will keep those eggs.

Q.: You prefer a solution of water-glass in the proportion of one to five?

Mr. Graham: Personally I would as soon use one to seven; but eggs from the one to five solution with poach better. I got some eggs from Mr. Zavitz a short time ago that had been in pickle eighteen months, and they would poach and beat equal to eggs put up this year The solution used by Mr. Zavitz was one to eight.

Q.: What is the cost of waterglass?

Answer: English water-glass costs 65 cents per gallon, and the cost of preserving the eggs is about 1½ cents per dozen. With the American article the cost will be about two cents per dozen. There is this objection to water-glass, that, after the eggs have been immersed for two or three weeks, a milky, white coating begins to form on them. The longer the eggs are in the solution the thicker and harder the coating becomes. It can be removed, however, by placing the eggs in warm water.

Q.: What effect had the different solutions on the shells of the eggs?

Mr. Graham: Practically none. Water-glass eggs, when polished up, can hardly be told from fresh eggs. All pickled eggs will crack when placed in hot water. The

FORAGE, FODDER, SILAGE AND HAY CROP.—(*Con.*)

Experiment.	Varieties.	Second years crop. Tons of Green Clover per acre. 6 tests.	Second years' crop. Tons of dry hay per acre. 9 tests.
20. Clover	Mammoth Red	7.3	4.0
	Common Red	6.0	2.1
	Alsike	5.6	2.6

Experiment.	Varieties.	Average height about six months after seeding, 2 tests. (inches.)	Second years' crop, tons of dry hay per acre. 1 test.
21. Perennial Crops	Lucerne	10.5	4.4
	Sainfoin	12.5	1.9
	Burnet	11.0	1.4

Experiment.	Varieties.	Second season's crop. Tons of hay per acre. 7 tests.	3rd and 4th seasons' crop. Tons of hay per acre. 4 tests.
22. Grasses	Tall Oat Grass	2.8	3.1
	Timothy	2.7	1.8
	Orchard Grass	1.9	1.6
	Meadow Fescue	2.2	1.5

There were in all eight distinct experiments with forage, fodder, silage, and hay crops conducted throughout Ontario in 1901.

Fodder Corn. The Mastodon Dent has been found to be one of the best silage corns for the early soils in Southern Ontario. The Wisconsin Earliest White Dent has given excellent satisfaction as a silage corn in central Ontario, and the North Star Yellow Dent variety appears to be very well suited as a silage corn for many districts of Northern Ontario. Although there was a considerable amount of difference in the average yield per acre in the tests of the three varieties of corn, it will be seen that the three varieties were about equal in popularity.

Millet. The Japanese Panicle millet has now headed the list in the co-operative experiments over Ontario for three years in succession, except in 1900, when the yield of the Japanese Barnyard Millet was the same as that of the Japanese Panicle variety.

Sorghum. Although a large number of varieties of sorghum have been under experiment for several years at the Agricultural College, no co-operative experiment was conducted with different varieties of sorghum until 1901. Although the Early Amber Sugar Cane produced only one-fifth of a ton per acre more than the Millo Maize, the Sugar Cane was decidedly the most popular among the experimenters.

Grass Peas and Vetches. The Hairy Vetches, Common Vetches, and Grass peas are all leguminous crops, and, therefore, like clover and peas, are valuable as nitrogen gatherers. These varieties have been distributed for co-operative experiments for three years in succession, and the Hairy vetches have given the largest yield of green crop per acre in each of the three years. The Hairy vetches surpassed the Common vetches in yield of green crop by 2.1 tons per acre in 1899, nearly 1 ton per acre in 1900,

and 2.1 tons per acre in 1901. It will be seen that the Grass peas are not only valuable for grain production by their being proof against the weevil, but they are a good variety for green fodder purposes.

Rape and Kale. The Dwarf Essex Rape and two varieties of Kale were distributed in 1901 for co-operative experiments, but no satisfactory reports of carefully conducted experiments were received. The Dwarf Essex variety of Rape is the one which has given the best satisfaction at the Agricultural College.

Clover. The average results for the clover as given in the table here presented is for the first crop in each year, the second crop of clover not being included. It will be seen from the average yield of the first cutting that the Mammoth Red Clover has given decidedly the largest yield of green crop and of hay per acre.

Sainfoin, Lucerne, and Mammoth Red Clover. An additional experiment was added to the list in 1900, which included three perennial legumes. We hope to be enabled to present some valuable results of this experiment in future reports.

Grasses. The results given for the different varieties of Grasses are for the second, third, and fourth season after the seed had been sown. No second crop in any one season is included in the average results here given. Of the four different grasses under test, the Tall Oat Grass has produced the largest crop per acre.

Culinary Crops.

Experiment.	Varieties of Beans.	Comparative value.	Yield per acre.	
			Straw. (tons.)	Grain. (bushels.)
23. Beans (10 tests.)	Marrowfat	100	2.1	26.7
	Medium or Navy	88	2.1	25.5

Experiment.	Varieties of Sweet Corn.	Table quality.	Comparative number of ears.	Number of days until ready for table use.
24. Sweet Corn (27 tests.)	Mammoth White Cory	100	93	86
	Country Gentleman	85	100	99
	Kendal's Early Giant	80	85	85

Two experiments were conducted in 1900 and again in 1901 with culinary crops.

Field Beans. Ten good reports were received in the autumn of 1901, giving the comparative results of the Marrowfat and the Medium or Navy varieties of beans. The Medium or Navy variety did not give as large a yield in comparison with the Marrowfat variety as it usually does. In the majority of experiments, both at the College and throughout Ontario, the Medium or Navy beans have yielded a little more than the Marrowfat variety.

Sweet Corn. All three varieties of sweet corn were quite popular among the experimenters. The Kendel's Early Giant proved to be slightly the earliest, the Country Gentleman gave the largest number of ears, and the Mammoth White Cory was the most popular of the three varieties. These are all good varieties for the production of green corn for table use.

Fertilizer Experiments.

Fertilizer.	Quantity per acre fertilizer used.	Bushels of oats per acre, 5 years, 74 tests.	Average yield per acre.					
			Tons of mangels.		Corn per acre.			
					Total crop (tons).		Ears (tons).	
			1901, 5 tests.	Average 5 years, 41 tests	1901, 2 tests.	Average 5 yrs., 40 tests.	1901, 2 tests.	Average 5 yrs., 35 tests.
	lbs.	bus.						
No fertilizer	none.	38.9	22.52	20.58	10.36	8.1	2.06	2.96
Nitrate of soda	160.0	46.3	35.32	26.54	10.88	9.1	2.42	3.30
Muriate of potash	160.0	43.8	28.86	24.55	10.92	9.1	2.18	3.32
Superphosphate	320.0	43.6	27.33	24.20	10.88	8.9	2.18	3.32
Mixed fertilizer	213.3	48.7	34.09	25.37	10.88	9.1	2.32	3.40

Note.—The cost price of the fertilizers was between three and four dollars per acre for the quantities used in these tests.

The superphosphate and the muriate of potash were applied to the land at the time of planting, and the nitrate of soda at the time that the plants were about three inches high. The mixed fertilizer consisted of one part nitrate of soda, one part muriate of potash, and two parts of superphosphate by weight.

Fertilizers With Mangels and Corn. Different fertilizers were used on both mangels and corn crops in connection with the co-operative experiments of the past year. As this experiment has been conducted on somewhat similar lines for ten years in succession, we not only present the results for the past year, but also the average results for fertilizers used with oats, mangels, and corn, each for five years in succession. The results of this experiment, as presented in the table here given, are worthy of careful study.

Miscellaneous Experiments.

Growing potatoes on the level and in hills.

Experiment.	Method of Cultivation.	Comparative value.	Yield per acre.	
			Percentage marketable.	Whole crop. (Bush.)
27. Potatoes, 45 tests	Potatoes grown on level	89	87	197.8
	Potatoes grown in hills	100	88	189.3

Planting potatoes the same day and five days after being cut.

Experiment.	Time of planting.	Comparative value.	Percentage of crop marketable.	Yield of whole crop per acre. (Bush.)
28. Potatoes, 11 tests	Potatoes planted immediately after cutting	100	85	120.1
	Potatoes planted five days after cutting	67	84	111.8

Planting cut potatoes which have and have not been coated with land plaster.

Experiment.	Treatment of cut seed.	Comparative value.	Percentage of crop marketable.	Yield of whole crop per acre. (Bush.)
29. Potatoes, 15 tests ..	Cut potatoes coated with land plaster....	100	76	190.5
	Cut potatoes not coated with land plaster	76	77	176.1

Planting corn in rows and in squares.

Experiment.	Method of planting.	Comparative value.	Yield per acre.	
			Husked ears. (Tons.)	Whole crop. (Tons.)
30. Corn, 7 tests	Corn planted in squares or hills	100	3.7	11.5
	Corn planted in rows or drills.....	64	3.7	10.4

Growing Potatoes on the Level and in Hills. A co-operative experiment to test the comparative results from growing potatoes on the level and in hills was conducted over Ontario in 1901 for the first time. In the average results of forty-five full reports of carefully conducted experiments, it is found that the potatoes which were grown on the level gave a total yield per acre of 16½ bushels more than those grown in hills. These results are very similar to the results obtained at the College in testing the two methods of cultivation. The experiment will likely be repeated another year.

Planting Potatoes the Same Day and Five Days After Being Cut. This experiment has been conducted for several years at the Agricultural College and for five years over Ontario, and the average results have been very similar in all experiments. As a rule, the potatoes which have been cut and planted on the same day have given from 10 to 20 bushels per acre more than those which have been cut and planted from four to six days after being cut, the average for the five years over Ontario being about 17 bushels per acre in favor of immediate planting.

Planting Cut Potatoes which have and which have not Been Coated over with Land Plaster. This experiment has now been conducted throughout Ontario for two years in succession. The average results show that the potatoes which were sprinkled with land plaster gave an increase of 16.4 bushels per acre in 1900, and an increase of 14.4 bushels per acre in 1901 over those on which no land plaster was used. This experiment has also been conducted for five years at the Agricultural College. It was found in the College experiments that cut potatoes which were coated with land plaster also gave better results than those on which no land plaster was used.

Planting Corn in Rows and in Squares. An experiment has now been conducted over Ontario for three years in succession, in which corn has been planted in rows three inches apart, and, in comparison with this, corn has been planted in squares or hills three inches apart both ways. Exactly the same amount of corn was used for each method. Flat cultivation was used throughout, and the same amount of cultivation was given to each method of seeding. The corn which was planted in squares, or "hills," surpassed the corn which was planted in rows, or drills, in total yield per acre by 1.2 tons in 1899, 1.6 tons in 1900, and 1.1 tons in 1901. In yield of ears per acre, the squares surpassed the rows by ½ ton per acre in 1899, and ⅕ ton per acre in 1900, but the results were equal in this respect in the average tests for 1901. These results throughout are in favor of planting corn in hills as compared with drills.

Q. : What is the weight per measured bushel of the Siberian oats ?

C. A. Zavitz : The average weight per measured bushel of the Siberian oats, as grown at the College for the past ten years, is about 36 pounds.

Q. : You mentioned that the Siberian oats gave about 2 bushels per acre more than the American Banner in 1901, and about 2½ bushels per acre more than the American Banner in 1900. Do some of the farmers use other varieties than the Banner as a basis of comparison ?

C. A. Zavitz : Yes, nearly all the experimenters sowed an extra plot with the best variety which they have been growing in the past, as was advised in the instructions. In summarizing the results, we find that the best variety which the Union distributed gave upwards of 5 bushels per acre more than the best varieties which were grown on the farms on which the experiments were conducted.

W. K. Farlinger : Conditions vary in different localities. The variety of oats which give the best results on high-rolling land might not give the best results on the level land.

C. A. Zavitz : That is true, and hence the great value of the local experiments, which will show better than any other way which are the best varieties for the different conditions of soil and locality. We do not expect that the varieties will be equally serviceable under all conditions. In selecting varieties for distribution, one of the chief objects is to combine in those varieties various characteristics, so that one or the other might prove very serviceable on any soil, and we naturally expect that the variety which gives the best results on one soil will be surpassed by another variety on a soil entirely different.

Q. : What variety of oats would do best for sowing with barley for grain production ?

C. A. Zavitz : If you take a variety of heavy yielding oats which is medium in reaching maturity, such as the Siberian, you would need to sow with them a late variety of barley, such as the Chevalier two-rowed, which makes an excellent mixture. If you take a medium ripening barley, however, such as the Mandscheuri, it is necessary to secure a very early ripening oat, such as the Daubeney, in order that they will ripen at the same time. Both of the mixtures here mentioned have given splendid results at the College.

Q. : How does the yield of the Mandscheuri barley compare with that of the Black Hulless variety ?

C. A. Zavitz : In the average of eight or ten years' experiments, the Mandscheuri barley has produced about one-third more pounds per acre than the Black Hulless variety.

J. H. Cole : The Hessian Fly is causing serious havoc in our barley crops in my section. Have you found much difference in the different varieties in resisting the attacks of the Hessian fly ?

C. A. Zavitz : We had no Hessian fly in the barley until the past summer. Even then there was not enough of the fly for us to make any determinations as to the comparative value of the different varieties in resisting the ravages of the Hessian fly.

Q. : How do the Grass peas compare with the Golden Vine as a nitrogen gatherer ?

C. A. Zavitz : The Grass pea is a leguminous plant, and I think would be about the same as the Golden Vine variety in drawing nitrogen from the atmosphere.

Mr. Wilson : The Grass pea ripened more evenly in my section than the other varieties.

C. A. Zavitz : On uniform land the Grass peas are usually pretty uniform in their growth, but on land which is uneven there are sometimes difficulties in parts of the field ripening earlier than other parts. The Grass pea is rather slow in reaching maturity.

Q. : At what time do you plant the Soy beans ?

C. A. Zavitz : We usually plant the Soy beans about the 5th of May.

Q. : How are the Soy beans usually planted ?

C. A. Zavitz : The seed should be sown in rows and the crop cultivated. The Soy bean is being used considerably in some of the Eastern States by dairymen who wish to secure very rich food for their animals. It is also beginning to be grown quite extensively in some of the Western States, particularly Kansas. The crop will serve admirably as a substitute for peas in those sections where the pea weevil is doing so much damage.

Dr. Saunders : Our experience with Japanese Millet is that the stems are not equal to other millets for feeding purposes.

E. M. Zavitz, Coldstream, Ont. : We have grown this Japanese millet for several years, and would not go back to the other varieties of millet, because we get twice the quantity of fodder, and more than twice the quantity of grain. After the Japanese millet ripens and we thresh it for the seed, the farm stock will eat the straw with relish.

Q. : How much grain do you get per acre ?

E. M. Zavitz : From 25 to 30 bushels on gravelly soil.

A Member : We get about the same amount in the West.

A Member : I find the Japanese millet does well on poor soil, but I grew it and cultivated it like corn, and it is well adapted to a light sandy soil.

Mr. Glendinning : I tried to grow the Japanese millet on very rich land, but did not meet with good success.

Q. : How does Amber Sugar cane compare with corn for feeding purposes and for the silo ?

C. A. Zavitz : It is somewhat richer, but I have had no experience in making silage from Sugar Cane.

Dr. Saunders : We tried sorghum in the silo, but with us it has always blackened. In some seasons, it will give a good crop, but our experience with it was unfavorable in the Ottawa District. It will not compare favorably with corn in a good year. We have had no success in keeping it in the silo. Perhaps it did not ripen well ; that has a great deal to do with the keeping quality.

Mr. Drummond, Ontario Co. : We have had three years' experience with it in the silo. This year we had twenty tons on top of the corn. We find it to be very successful, and that it keeps in the silo about as well as corn.

Dr. Saunders : Was it the same variety here referred to ?

Mr. Drummond : Yes, the Amber Sugar Cane. We had 50 per cent. more by weight than from corn. Our experience is that it keeps about as well as corn, but the sugar cane silage does not make quite as good food as the corn silage.

Mr. Fixter : We fed sugar cane to pigs last year with very good results.

T. H. Mason : I know of a farmer who has fed it to horses very successfully.

A Member : A man near me had nine acres of sugar cane. He made syrup out of it. Six acres yielded 117 gallons of molasses to the acre.

Q. : Last year we saw something about cattle being poisoned on sorghum.

C. A. Zavitz : We heard of a little trouble from pasturing sorghum in the Western States last year. I made enquiries regarding it, and from what I could glean there need not be much fear on this account. Some farmers in the West have pastured sorghum for several years with excellent results. Sorghum can be used for many purposes. It can be pastured, used as a green or a dry fodder, put in the silo, ripened for the grain, or used for the production of molasses.

Q. : Is the grain of equal value with other grains for feeding ?

C. A. Zavitz : The grain is quite starchy, but I think would be nearly equal to corn for feeding purposes.

Mr. Van Adam : Cow peas grow well with sorghum and give good results in the silo.

Dr. Saunders : The Awnless Brome Grass is a wonderfully good grass for the Northwest, yielding about 3½ tons of hay to the acre at Indian Head. I do not know whether it would be as good for Ontario, but it has done very well at Ottawa.

C. A. Zavitz : We have grown the Awnless Brome Grass at the College for a number of years, but have not found that this Grass gives as good results as it seems to give in the West.

A Member: We have had it on our farm for 25 years and wish we could get rid of it.

Dr. Saunders: I do not think that there is much trouble in getting rid of it, if it is plowed at the right season. I saw an irrigated crop near Calgary that was running from 3 to 3½ tons per acre. It seems to succeed better in the West, under adverse conditions, than any grass we have ever tested.

Q.: Has the black sweet corn been tested?

C. A. Zavitz: The Black Mexican sweet corn has been grown at the Agricultural College for several years. It was also distributed as one of the three varieties for co-operative experiments in 1900. It is a very fine corn, of good flavor and very juicy. If the ears are taken when quite young, the black color does not show much.

Mr. Caston: Have you found very marked benefit from using fertilizers with mangels?

C. A. Zavitz: Taking the average of our experiments for five years over Ontario, we find that the use of 160 pounds of nitrate of soda per acre has increased the yield of mangels 6½ tons per acre. This is one of the most striking effects in connection with our fertilizer experiments. The cost of the 160 pounds of nitrate of soda per acre was about $3.80.

Dr. Saunders: The results of the co-operative experiments in growing potatoes on the level and in hills correspond very nearly with the results at Ottawa. We have given up growing our field potatoes in hills. Taking one year with another, the results were better from the level cultivation.

Mr. Fixter: At what stage was the hilling done?

C. A. Zavitz: The experimenters were allowed to hill the potatoes as they had been in the habit of hilling potatoes in previous years. No definite time being mentioned in the instruction sheets as to when the hilling was to be done.

Dr. Saunders: It has been a surprise to me for some years to know how small the average potato crops in Ontario are in comparison with the yields obtained at Ottawa. It seems to point to the fact that Ontario has not a very favorable climate for the production of potatoes. We have a good deal more moisture in the Ottawa valley than in many parts of Western Ontario. That may be the principal cause for the reason of the difference in the yields.

C. A. Zavitz: I think the large amount of moisture in the Ottawa valley has a good deal to do with the large yields of potatoes grown at Ottawa. I have noticed that several crops can be grown in the Ottawa valley better than in almost any other part of Ontario. For instance, I have found no place in Ontario where the Horse beans proved successful one year with another, except in two or three counties along the Ottawa valley, where the Horse beans usually give very good results.

Hon. John Dryden: In the experiment in planting potatoes immediately and five days after they were cut, how were the cut potatoes kept during the five days?

C. A. Zavitz: We thought it advisable to give the experimenters no definite instructions along this line, but allow each to keep the cut potatoes as he thought best. Each experimenter was requested to state in his report the number of hills of potatoes which grew from each lot of potatoes planted. Unless the number of hills were practically the same in both cases, the results were not used for the summary report which is here presented.

Dr. Saunders: I take the greatest interest in this Association. I think it one of the best in existence in securing valuable information. We are all interested along the same lines, and I wish to say that if any one here would like the reports from Ottawa, they could get them, free of charge. I think they will find many things in the reports that will be useful to the people of Ontario.

C. A. Zavitz: We all appreciate very much Dr. Saunders' remarks regarding the Union, and also his liberality in offering to supply the ex-students and other farmers from over Ontario who are here assembled with the reports of the Dominion Experimental Farm. We all want to secure the best information we can get from different

sources, and I would advise all to get all the reports issued at Ottawa, and make the best use possible of the results of the experiments there presented.

While much has been said regarding the value to the Province of the results of the co-operative experiments, I hope none will get the impression that the financial results of the co-operative work are the only benefits obtained therefrom. I consider that the educational influences of these co-operative experiments are even greater than the influences of the experiments from a financial standpoint. The educational training in the carrying out of these experiments has a very beneficial influence not only upon the experimenters themselves, but also upon their families, their neighbors, and their fellow-farmers generally. People find out that by a little work and care in conducting experiments along definite lines, they obtain a special training and definite information which cannot be obtained in any other way, and which is of the utmost importance to them in their future work. In the sixteen years that we have been conducting the co-operative experiments in agriculture throughout Ontario, and during which time I have been closely connected with this work, I have been greatly pleased with the interest which has been taken in this work by the farmers generally, some of whom undoubtedly took but little interest at first, but afterwards developed into careful and enthusiastic experimenters, and obtained results which were of great value not only to themselves but also to others. On behalf of the Union, I wish to thank the experimenters most heartily for the excellent work which they have done for the good of themselves and for the Province generally.

REPORT ON CO-OPERATIVE EXPERIMENTS WITH SMALL FRUITS.

By Prof. H. L. Hutt, Ontario Agricultural College, Guelph.

The wonderful progress that has been made in fruit growing in this country of recent years is a subject well worthy of note. The time is still fresh in the memory of many of our people when the pioneer plantings of any considerable extent were made. These were naturally in the older sections, bordering the shores of Lakes Ontario and Erie, and along the St. Lawrence and Niagara Rivers. In the newer and interior sections the people depended upon the wild fruit, found in more or less abundance, or, failing that, they went without it.

The first plantings were mostly apple and pear trees, but after a time it was found that the more tender fruits, even grapes and peaches, could be grown to perfection in the Southern sections. Plantings of all kinds of fruits became general, and they spread into all parts of the country. Now this might well be called a land of "corn and wine," of "milk and honey," of "peaches and cream" : in fact, a hundred more appropriate names than the land of the "Lady of the Snows."

The display made this year at the great Pan-American Exposition, and also at the Glasgow Exhibition, has helped to open the eyes of the world at large to our capabilities in the way of producing a great variety of fruits of superior excellence.

At the Pan-American, our exhibit was pronounced first in quality and second only to New York in variety.

We now produce annually over three million barrels of apples in this Province alone, and our shipments to the Old Country markets are assuming enormous proportions. Efforts are now being made to perfect the means of transportation, that we may place on British markets in good condition our more luscious tender fruits. One evening last fall I helped load at the Grimsby station two carloads of Bartlett pears, which were being shipped to the Glasgow market. Several other car-loads were shipped from the same place this season, and these are only a beginning of what will be sent as soon as complete systems of cold storage can be secured on both railroads and ocean steamships.

The fruit industry in Ontario is now one of the most important industries of the Province, and it is growing fast. The Government has recognized its importance, and has established fourteen Fruit Experiment Stations in various parts of the Province, to enable growers to find out what are the best varieties of the different kinds of fruits for each particular section, that they may waste no time and expense in growing inferior or worthless varieties. These stations are doing good work, and the results of these tests are giving fruit growers just the information needed.

The Experimental Union also has been helping on the work by introducing a system of co-operative experiments with small fruits. This work was begun eight years ago with sixty experimenters, and every year since then it has been steadily increasing, until now we have on our books the names of about one thousand experimenters located in different parts of the Province, who have been carrying on these tests with small fruits on their own farms. Our co-operative experiments are helping to encourage the growing of small fruits on many farms throughout the country, where they have not been grown before. During the time we have been engaged in this work, we have distributed 2,256 currant bushes; 3,220 gooseberry bushes; 3,600 blackberry plants; 4,440 black raspberry plants; 4,440 red and white raspberry plants ; and 25,008 strawberry plants, or a total of 42,964 plants. This large number of plants of the leading varieties distributed in small lots all over the Province is having its influence in encouraging the growing of fruits by farmers generally, and we hope it will hasten the time when all of our people will know the satisfaction of having a good supply of fruit for home use throughout the year.

The following circular, sent out early in the spring of the present year, gives the list of experiments, as offered to experimenters this year :

Co-Operative Experiments in Horticulture.

Dear Sir,—Through the agency of the Experimental Union, arrangements have again been made for furnishing plants for a number of co-operative experiments with small fruits.

The varieties for the several experiments offered this year are as follows :

I. Strawberries—Clyde, Haverland, Saunders, and Van Deman—12 plants of each.
II. Raspberries—Cuthbert, Golden Queen, Marlboro', and Shaffer—6 plants of each.
III. Black Raspberries—Gregg, Hilborn, Palmer and Souhegan—6 plants each.
IV. Blackberries—Agawam, Gainor, Kittatinny, and Snyder—6 plants of each.
V. Currants—Fay, Raby Castle, Victoria, and White Grape—3 plants of each.
VI. Gooseberries—Downing, Pearl, Red Jacket, and Whitesmith—3 plants of each.

Each person wishing to join in the work, may do so by choosing one of the experiments, and signing the agreement contained in the accompanying form of application. The experiment selected may be indicated by number. It is well for each applicant to make a second choice, in case he may be too late for the first. The supply being limited, plants will be furnished in the order in which the applications are received ; those who apply promptly will be most likely to receive what is asked for.

Instructions for conducting the tests will be sent to each experimenter before the plants are mailed, and blank forms will be furnished from year to year, upon which to report the results. All will be furnished free of charge, and the plants and produce become the property of the experimenter. In return, we expect that each experimenter will follow the instructions given, and will report each year, as requested, upon the growth and yield of each variety under test.

These plants are purchased from nurserymen at considerable expense, and as the funds at our disposal for this purpose are limited we can seldom furnish plants to more than half of those applying for them. We would like, therefore, that they go to those only who will make an honest effort to make the experiment a success, and we trust no one will apply for plants unless he is prepared to make such an effort, and will report the results as requested.

Trusting that your interest in the work may lead you to become a successful experimenter,

H. L. Hutt.
Director of Co-operative Experiments in Horticulture.

The following form of application, which is sent with the circular offering plants for testing, states the terms upon which the plants are sent out. It is in reality an agreement on the part of the experimenter to follow the directions given and report results :

Application for Plants for Co-Operative Experiments in Horticulture.

Dear Sir,—Kindly forward to me the plants for the experiment which I have selected as indicated below. If my application is received in time to entitle me to them, I agree

1. To conduct the experiment according to directions furnished.
2. To look after the plants and exercise care and accuracy in reporting the results.
3. To report upon the growth and yield of each variety at the end of each season as requested.

Name... .. ..
Post Office.. . . ..
County.. ... .
Experiment chosen 1st choice.. ... ...
(Indicate by Number) 2nd choice. ... ...

(This sheet, when filled out and returned by mail, will require 2c. postage whether the envelope is sealed or not.)

As soon as the list of experimenters for the year could be made up, the following circular was sent out informing applicants that they might expect the plants in due time, and giving general directions for conducting the experiments. Accompanying this was a sheet giving special cultural directions for the particular experiment chosen :

Dear Sir,—I am pleased to inform you that your application for plants for co-operative testing was duly received, and that the plants will be forwarded to you as soon as the weather is suitable for planting. If they cannot be planted as soon as they are received they should be unpacked, so that the roots may be spread out and buried in moist earth ; but the sooner they can be permanently planted, the better.

The soil upon which they are to be planted should be as uniform as possible, so that all varieties may have an equal chance.

As soon as planted, each variety should be carefully labelled. Stout wooden stakes painted white, written on plainly with a lead pencil, and driven firmly into the ground answer the purpose well. It is advisable, also, to make a record of the planting in a notebook, in case a label should at any time be lost.

I trust you will follow the directions carefully, and that you will not allow poultry or trespassers to interfere with the fruit. The weight of the entire crop from each variety is one of the most important items desired in your annual report; and, in order that this may be given accurately, it will be necessary for you to carefully weigh and record each picking, so that the total yield of each variety may be reported at the end of each season. Blank forms will be mailed to you in due time each season, upon which to make such report.

The value of this experiment depends largely upon the attention given to it. I trust you will find it both interesting and profitable. From this small collection of plants you may, in time, by good management, propagate for yourself all the plants you wish, without interfering with the value of the experiment in the least.

Should you require any further information regarding the work, kindly let me know and I shall be pleased to give all the assistance possible.

The Strawberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of barnyard manure.,

2. Set the plants in rows, at least 4 ft. apart and about 18 inches apart in the row. If two or more varieties are planted in the same row, leave a space of at least 3 ft. between them to avoid mixing of the runners.

3. The best method of planting is to use a spade, thrusting it deeply into the ground, then pressing it backwards and forwards. Into the opening thus made, spread out the roots fan-shaped, and pack the soil firmly about them with the foot.

4. Give clean, thorough cultivation throughout the season, and never allow the soil to become crusted.

5. Pinch off all blossoms the first season, that the plants may make vigorous growth and not waste their energies trying to produce fruit.

6. Confine the runners of each variety to its own row, allowing them to form matted rows about a foot and a half wide. If any of the plants should die, place the runners of the adjoining plants so that they will fill up the spaces.

7. As soon as the ground is frozen in the fall, cover the whole plantation with two or three inches of strawy stable manure. When danger of frost is over in the spring, rake the coarsest of this covering off the plants and tread it down between the rows for a mulch. If it is not thick enough to keep down weeds and retain moisture, more may be added at any time in the spring.

8. To continue the experiment from year to year, a similar plantation should be set out each spring, taking a dozen new plants of each variety from the plots set out the year before. The old plots may be plowed up after the second crop is off.

9. Carefully weigh and record the weight of each picking from each variety, and report as soon as possible after the fruiting season.

The varieties of strawberries sent out last spring were: Clyde, Haverland, Saunders, and Van Deman.

These were sent to 116 experimenters, only one-half of whom have as yet reported. The majority of those reporting say that much difficulty was experienced this season in getting a good stand of plants. The best results come from the northern and eastern sections of the Province, where they had not the extreme drouth which prevailed in the southern and western sections.

The varieties sent out a year ago were Clyde, Haverland, Saunders, and Glen Mary. Thirty-five experimenters report this year on the yields obtained. In some places one variety has done best, and in other places near by another leads; but, on the whole, the Clyde has made the best showing. Haverland also did well, and is highly spoken of by many of the experimenters.

Each of the varieties has its good qualities, and they are all well worthy of a place in any collection for home use or market.

The Red Raspberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Plant in rows 5 or 6 feet apart, with plants 5 feet apart in the row.

3. Give clean, thorough cultivation until about the beginning of August, and never allow the soil to become crusted.

4. Pinch off any blossoms which may form the first year, that the plants may not waste their energies trying to produce fruit.

5. Do not allow the varieties to become mixed by letting the suckers grow between the bushes.

6. In the fall, or early in the spring, cut out all old canes that have fruited, and leave about six of the strongest new canes to each bush. Shorten the ends of these to a uniform height, making the bushes uniform and symmetrical.

7. In northern localities, where winter protection is needed, bend down the canes late in the fall, and cover the tops with earth to keep them under the snow.

8. Should any spaces have to be filled, or should the experimenter wish to increase his stock of any of the varieties, it may readily be done by taking up the young suckers which spring up about the bushes. Shaffer is propagated by bending down and covering the tips of the new canes in August. They will make good plants by the next spring.

9. Carefully weigh and record the weight of each picking from each variety, and report as soon as possible after the fruiting season.

For this experiment, the varieties selected were Cuthbert, Golden Queen, Marlboro' and Shaffer. Thirty-five lots of plants were sent out last spring and twenty reports have been received this fall upon the growth of the plants. Nearly all report good success with the planting, most of them speak of the great vigor of growth of the Shaffer. Twenty-two experimenters report upon the yield of the same varieties sent out in previous years. Shaffer is conceded by nearly all to be the heaviest yielder of the lot. This is one of the purple varieties, a very desirable one for home use, but not such a favorite in the market as some of the lighter colored berries. Cuthbert comes second

in point of yield. This is a firm, bright red berry, that has long been known as the Queen of the market. The Golden Queen is much like the Cuthbert, except that the fruit is yellow. Marlboro' ranks last for yield, but it is the first to ripen its fruits. These four varieties cover the season well from early to late, and make an excellent selection for home use or market.

The Black Raspberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Plant in rows 5 or 6 feet apart, with plants 5 feet apart in the row.

3. Give clean, thorough cultivation until about the beginning of August, and never allow the soil to become crusted.

4. Pinch off any blossoms which may form the first year, that the plants may not waste their energies trying in produce fruit.

5. To make the bushes stout and stocky, pinch off the ends of the new canes during the early summer, when they are two or three feet high.

(In northern localities, where winter protection is needed, this should not be done, as the canes should grow long and slender, that they may be more easily laid down.)

6. In the fall, or early in the spring, cut out all old canes that have fruited, and leave about six of the strongest new canes to each bush. Shorten the ends of these to a uniform height, making the bushes uniform and symmetrical.

7. In northern localities, where winter protection is needed, bend down the canes late in the fall, and cover the tops with earth to keep them under the snow.

8. Should any spaces have to be filled, or should the experimenter wish to increase his stock of any of the varieties, it may readily be done by propagating new plants from the tips of the new canes, which should be bent down and covered with earth in August. They will make good plants by the next spring.

9. Carefully weigh and record the weight of each picking from each variety, and report as soon as possible after the fruiting season.

The varieties included in the Black raspberry test are Gregg, Hilborn, Palmer, and Souhegan. Thirty-five experimenters received plants this spring, and twenty-four report this fall upon them. On the whole, black raspberries have not lived so well as the reds, but most of the experimenters have some of all kinds living, and can easily propagate from these what more they need.

Twenty-two reported upon the fruiting of plants sent out in previous seasons. There is a good deal of difference in the results reported, but Hilborn and Palmer appear to have been the most productive.

To ascertain definitely just which is the best black cap for any particular section seems to be a difficult matter, as the varieties vary so much in different seasons. We have been testing about two dozen varieties at the College here during the past five years, and every year some new variety appears at the head of our list as having made the best yield. Last year Hilborn and Palmer were ahead, and this year it was Eureka and Gault.

The Blackberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Plant in rows 5 or 6 feet apart, with plants 5 feet apart in the row.

3. Give clean, thorough cultivation until about the beginning of August, and never allow the soil to become crusted.

4. Pinch off any blossoms which may form the first year, that the plants may not waste their energies trying to produce fruit.

5. To make the bushes stout and stocky, pinch off the ends of the new canes during the early summer, when they are two or three feet high.

(In northern localities, where winter protection is needed, this should not be done, as the canes should grow long and slender, that they may be more easily laid down.)

6. In the fall, or early in the spring, cut out all old canes that have fruited, and leave about six of the strongest new canes to each bush. Shorten the ends of these to a uniform height, making the bushes uniform and symmetrical.

7. In northern localities, where winter protection is needed, bend down the canes late in the fall, and cover the tops with earth to keep them under the snow.

8. Should any spaces have to be filled, or should the experimenter wish to increase his stock of any of the varieties, it may readily be done by taking up the young suckers which spring up about the bushes.

9. Carefully weigh and record the weight of each picking from each variety, and report as soon as possible after the fruiting season.

The varieties tested in the Blackberry Experiment were Agawam, Gainor, Kittatinny, and Snyder. Thirty-five experimenters received plants last spring and twenty report this spring on the success of their planting. A few lost one or more plants, but most of the experimenters report all plants living.

Fifteen reports have been received from the plants sent out previous years.

Blackberries are the least hardy of the bush fruits commonly grown in this country. In some sections, the plants were frozen to the ground last winter. The Snyder is reported as being the most hardy, but where the plants have suffered by winter killing, the Kittatinny has produced the largest yields and the finest berries.

The Currant Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Set plants five feet apart each way, in one or more rows, as convenient.

3. Give clean, thorough cultivation until about the first of August, and never allow the soil to become crusted.

4. Look out for currant worms on the lower parts of the bushes soon after the leaves are fully grown. They may be destroyed by spraying with Hellebore (1 oz. to 3 gallons of water), or Paris green (1 oz. to 10 gallons of water.)

5. Prune early every spring. A good method of pruning is to leave six inches to form the bush, then keep up a renewal of new wood by cutting out every year, two of the oldest branches, and allowing two strong new ones to take their place. Cut out all other new canes, and shorten back the new wood left nearly one-half.

6. Carefully weigh and record the weight of the crop from each variety, and report as soon as possible after the fruiting season.

The varieties of Currants in the Currant Experiment are Fay's Prolific, Raby Castle, Victoria, and White Grape. Plants were sent to thirty-eight experimenters last spring and thirty reports on the same have been received. With but one or two exceptions, all succeeded in getting every plant to live. This is a remarkably good record of planting among so many planters.

Thirty-one experimenters reported on the yield of the bushes set out in previous years. The honors for first place are pretty well divided among the four varieties ; but, on the whole, Fay's Prolific seems to be the favorite. White Grape has made a good showing, and is an excellent variety for home use ; but, like other white fruits, it does not have the demand in the market that the red varieties do.

The Gooseberry Experiment.

1. Prepare the land deeply and thoroughly, working in, if necessary, a liberal application of manure.

2. Set plants five feet apart each way, in one or more rows, as convenient.

3. Give clean, thorough cultivation until about the first of August, and never allow the soil to become crusted.

4. Look out for currant worms on the lower parts of the bushes soon after the leaves are fully grown. They may be destroyed by spraying with Hellebore (1 oz. to 3 gallons of water), or Paris green (1 oz. to 10 gallons of water.)

5. The English varieties—Industry and Whitesmith—are subject to mildew. This may to a great extent be prevented by spraying with potassium sulphide (1 oz. in two or 8 gallons of water). It should be applied early in the season, just as the buds are swelling, and five or six times afterwards, at intervals of ten days or two weeks

6. Prune early every spring. A good method of pruning is to leave six branches to form the bush, then keep up a renewal of new wood by cutting out every year, two of the oldest branches, and allowing two strong new ones to take their place. Cut out all other new canes, and shorten back the new wood left nearly one-half.

7. Carefully weigh and record the weight of the crop from each variety, and report as soon as possible after the fruiting season.

For the Gooseberry Test the varieties selected were Downing, Pearl, Red Jacket and Whitesmith.

Fifty-two lots were sent out last spring, and thirty reports on these have been received this fall. The majority of the experimenters report very good success in planting, but quite a number lost one or more plants of Whitesmith. This is one of the English varieties, the plants of which are usualy imported from the Old Country, and thus lack the vitality and vigor of the American varieties.

Twenty-five experimenters report on the plants sent out previous to last year. By the majority Pearl and Downing are reported as the most productive, although Red Jacket has done well and has produced large berries.

Whitesmith bears the largest and finest berries, but this variety, like other English varieties, when grown in this country, is very subject to mildew.

In conclusion, I may repeat what I have said in former years, that is, the greatest value of this co-operative work is not in the brief summary presented at this annual meeting, but the greatest good naturally is obtained by the individual experimenters who carry on the experiments, and from the many reports sent in we have abundant evidence that the majority of the experimenters appreciate the work and are profiting by it.

Mr. McNeill: I agree with Prof. Hutt that there is great good in these experiments for the experimenters themselves, but I think this phase of it might be extended to the boys on the farm. If the fruit growers would endeavor to interest their small boys in conducting these experiments it would be a means of education not less valuable than that afforded at the high school. My own small boy is immensely interested in it, and knows more about fruit growing than he would have been able to gather by years of work in some other lines.

In the matter of planting strawberries I find it pays to wait a few days for favorable weather. The way for them to get a good start is to have cloudy weather for a day or two after planting. Rapid planting is also very desirable.

Mr. Sherrington: What Mr. McNeill says as to strawberry planting is correct. The plant has a small, fibrous root, and if it is exposed to the air and sun for a few minutes it becomes shrivelled and dried up, so that it is impossible to make the plant grow. The plants should be kept moist and shielded from the sun and air. I carry my plants in a sack that has been dipped in water. It is very important to press them firmly in the ground. After planting, the ground should be cultivated so that it will hold the moisture. It is, of course, important to cultivate throughout the season. There is room for much discussion on the planting of raspberries, and also as to the best varieties for different districts. Some of those sent to my district have been of no use at all for the market. Some are good for home use, but I think we should look more for the commercial berry, for that will be good for our own table also.

Mr. Robert Thompson (St. Catharines): As regards getting our small boys interested, unless we would give our small boys the fruit, there is not much use in asking them to look after the plants. As to market varieties, I think one of the chief objects in these experiments is to get fruit among farmers who have no fruit, and to encourage by every means the people in the back counties to grow more and more fruit. About the difficulty of getting the plants to the parties early in the spring I would suggest that some of the plants could be sent to the north in the previous fall and planted out, because they do not suffer from thawing and freezing as we do in the south.

Prof. Hutt: I agree with what Mr. Thompson suggests. We have followed the plan of sending out plants in the spring because that is the usual time for planting; but our experiments at the College have been in favor of fall planting for currants and gooseberries. Last year they were set out at the end of the first week of November and with very good results. I do not think this would succeed so well with black raspberries as with red. As to the time for planting strawberries, there is quite a difference of opinion. Our experience is that it is well to hold off plant-

ing in the spring till the ground is in good shape, and the plants begin to make new growth. We usually plant about the first week in May. We find that plants set out after a little growth has been made in the spring are most vigorous and we lose very few of them. We always cut back the tips of the roots of strawberry plants brought from a distance, and if the plants are at all dried, we soak them in water for a while, and in that way save most of the plants. We watch for cloudy, showery weather for planting. Strawberry plants need very careful handling, as they are more readily injured than other plants.

Q. Have you tried planting strawberries with only a surface cultivation in the spring? They say the ground does not dry out so rapidly.

Prof. Hutt: Our practice in preparing the ground for strawberries has been to plow in the fall, apply the manure and then rib it up. In the spring the ground is worked down as soon as it is dry enough. In that way we save soil moisture from the start. I would not advocate planting without plowing in the spring unless the soil is mellow enough for the spade to go straight down, so as to allow the roots to go straight down also.

Mr. Caston, Craighurst: I think every farmer should induce some of the younger members of his family to take an interest in the fruit experiments. Too many farmers are not growing any small fruits. As to strawberry planting, I find it an important thing to trim off the runners and the old rusty leaves before planting. Do not allow the plants to bear any fruit the first year, because they require all their vitality and energy to form good plants. In blackberries I would suggest that Prof. Hutt should add the Eldorado to his list of varieties for co-operative experiments, as it is good for the northern district. I would recommend that and the Agawam. They will stand a temperature of 25 below zero, and they yield an excellent crop of choice berries.

REPORT OF CO-OPERATIVE EXPERIMENTS WITH EGG PRESERVATIVES.

By W. R. Graham, B.S.A., Agricultural College, Guelph.

In our experiments this year our experience has been somewhat different to that of last year. This year there is a diversity of opinion among the experimenters as to which is the better preservative. The highest individual score was for eggs preserved in the lime water, but when we come to the general average the conclusions are not so favorable.

We sent out twenty-one different samples of preservatives, but up to this morning I have received but nine replies from parties who were able to successfully conduct the experiment. This is not a very large percentage, but the results are valuable so far as they go.

The first experiment of the series was conducted with one part of water-glass to five parts of water. I may say that water-glass, or sodium silicate, resembles extracted honey in appearance. There are two kinds, the American and the English. The American will allow an egg to sink when diluted with five times its own bulk of water, while the English must be diluted twelve times. From drug stores you usually purchase the American article, but if you purchase from soap factories you usually get the English water-glass. The latter you will have to dilute one to twelve or one to fifteen in order that the eggs may sink. Then, if the eggs are not more than twenty-four hours old they will sink, but if they are two or three days old they will not. With American water-glass one part of water-glass to seven parts of water will give the best general satisfaction.

The lime solution used in our experiments was made by slacking two pounds of ordinary fresh lime and adding to it one pound of salt. After stirring well, add four gallons of water. This is stirred and then allowed to settle. You afterwards pour off the liquor, which is used as the preservative. Pure lime-water is practically as good as

lime-water and salt. It is necessary to cover the jar in which the pickle is put. Where it is left open to the air and disturbed once or twice in the season, you will not get good results.

In our score cards for scoring the results of the experiments, we allowed fifty points or ten for each of the following: Flavor, density of white, toughness of yolk, beating qualities, and poaching qualities.

Where eggs were put up in ordinary salt, the evaporation was equal to 33 per cent. of the contents of the egg. Where the eggs were greased, this was reduced to 25 per cent. There is no evaporation of the egg with the water-glass or lime solution. Three per cent. of the eggs put up in salt were bad, but where the eggs were greased, there were none bad.

In the experiments with water-glass, one to five, the eggs scored 44 out of a possible 50. Where the water-glass was one to seven, the eggs scored 43.2 out of 50.

With the lime and salt solution, the eggs scored 40, and in the lime-water they scored 41.

The eggs put up in salt scored 37, and the greased egg put up in salt scored 38.

Three of the experimenters scored their eggs put up in the lime water higher than any others. This solution received the highest individual score. But two experimenters report their eggs very bad in that solution. Others report these eggs to be inferior to those preserved in water-glass. While this is a first-class pickle, a great deal seems to rest with the experimenter and the carefulness with which the experiment is conducted. At the College, the eggs kept in the lime solution in the house cellar turned out favorably in every respect, except that they had a slight flavor of lime. The eggs we had in the same solution in cold-storage were all bad and mouldy on the top. I do not know whether the dampness had anything to do with it, but the eggs in water-glass in cold-storage kept very well. I think it will be necessary to continue this experiment for four or five years if we are to reach definite conclusions, as it gives very variable results. This year the worst and the best results came from the same town. I notice that with experimenters who conducted experiments with lime solution both last year and this year, the results this year are better than last.

Q.: Have you tried oil with this solution?

Mr. Graham: Yes; but it did no better with me. The lime solution with me gave good satisfaction, except in the cold storage building, but these particular eggs were gathered from the egg waggon and not from our own department, which may have had something to do with it; but they stood the candle test before pickling, which is as far as we can tell. If you pickle eggs in July without first testing them in this way you will not have many good ones. In Gunn Bros.' establishment this year, with some of the July and August eggs, eight out of ten were more or less incubated. It is hardly possible for the egg dealer to supply eggs in any other condition during the hot weather, for if they are left for three or four hours in the hot sun, 90 per cent. will have started to hatch, and are no longer suitable for pickling. No pickle made will keep those eggs.

Q.: You prefer a solution of water-glass in the proportion of one to five?

Mr. Graham: Personally I would as soon use one to seven; but eggs from the one to five solution with poach better. I got some eggs from Mr. Zavitz a short time ago that had been in pickle eighteen months, and they would poach and beat equal to eggs put up this year The solution used by Mr. Zavitz was one to eight.

Q.: What is the cost of waterglass?

Answer: English water-glass costs 65 cents per gallon, and the cost of preserving the eggs is about 1½ cents per dozen. With the American article the cost will be about two cents per dozen. There is this objection to water-glass, that, after the eggs have been immersed for two or three weeks, a milky, white coating begins to form on them. The longer the eggs are in the solution the thicker and harder the coating becomes. It can be removed, however, by placing the eggs in warm water.

Q.: What effect had the different solutions on the shells of the eggs?

Mr. Graham: Practically none. Water-glass eggs, when polished up, can hardly be told from fresh eggs. All pickled eggs will crack when placed in hot water. The

that are the menace to our dairy industry, and it is the small wage paid to the makers that is one of the drawbacks to our business. I also realize that the patrons who keep down the wages are the kind of men who will not furnish the best quality of milk. If we are going to make any great progress it must be in dealing with the patrons rather than in instructing the makers. Our makers have dairy schools to go to and they are fairly well equipped, but our future improvement has got to come largely through dealing with the patrons. We should have instructors with more authority to go to the homes of the patrons, see to the sanitary surroundings and the way the milk is kept, and also look after the sanitary conditions of the factories. There has been a good deal of legislation as to cheese, and it has been in the public interest. Why should we not have more legislation in regard to butter? It would be a good thing if the name of the factory were printed on the box and also the date. A good deal of our butter is kept too long in cold storage before it gets to the old country market. It should be placed on the market as quickly as possible in order to be first grade.

Hon. Sidney Fisher: I came here this morning to take advantage of the meeting of your Experimental Union and try to learn from your experience. I have been much interested in what I have heard, more particularly perhaps in the dairy discussion, because that is the branch in which I am personally interested. I have also had charge of a certain part of this work as Minister. Through the head of that branch of my Department we have been working as best we could in the interest of the commerce of our dairy products as well as in the interest of production. So far as the manufacture and production is concerned Mr. Ruddick has given us a sketch of the present condition of affairs. I venture to say that what he has told this audience is true in fact, and we trust that his statement of these facts going abroad through the country will lead to improvement. It is better for us to face our failings and to understand them than try to hide them. We are a strong enough people and are intelligent enough to be able to overcome our difficulties if we recognize them. If we ignore them and try to hide them from ourselves as well as from our rivals we shall never overcome them.

What Prof. Dean has said with regard to co-operation I believe to be a fundamental truth. The dairy business is a part of farming in which co-operation has begun. It has not yet been carried to perfection by any means. We have diverse interests, and these interests ought to be harmonized.

Cold storage is a means to an end. It is the means by which our products may be carried to the market, but cold storage cannot make bad products good; it can only preserve the products in the condition in which they are when they leave the factory. The foundation of all our dairy progress is proper manufacture. This can only be successfully conducted if the milk, the basis of all, is provided under proper conditions. This comes right home to the farmer and the man who milks the cow, and the man who feeds the cow and takes care of her and of the milk she produces. Here is perhaps the chief failing in our dairy production. I believe more difficulty arises in our factories from bad milk than from anything else. We have a most important work to do in teaching the average farmer to feed his cow and to care for his cow properly, and to handle her milk before it arrives at the factory. This work I think, can best be done through the Farmers' Institutes. You have a splendidly organized system. Through its means, as well as through the Experimental Union, you can reach every nook and corner of the Province, and it is necessary to reach every individual farmer in the country before we can have systematic improvement.

SOIL CULTIVATION.

By T. G. Raynor, B.S.A., Rosehall.

I do not know that I can say anything on the cultivation of the soil that will be really new to the advanced farmers which I have before me at this annual meeting.

Most of you are acquainted with the success that attended Mr. William Rennie's efforts in this direction at the College Farm. I am glad to find that the principles which he advocated are now being followed by many farmers throughout the Province, and that a measure of success is attending the efforts of most of those who have thus followed his advice. We all know the objects of the cultivation of the soil. These objects will necessarily be found in the answers to the questions which Prof. Roberts put before the Union meeting last year, when he asked the unthrifty plants three questions. He said to them, "Little plants are you hungry, are you thirsty, or are you lousy ?" In the answer to the first question will be found the chief object in the cultivation of the soil, namely, to provide plant food. In the answer to the second question the problem of retaining soil moisture is involved. My intention, however, is not to deal so much with these questions as with the methods involved in cultivating the soil. In different sections various methods are in vogue, as the requirements are different. The principles governing the cultivation of light and heavy soils are different. One of the most important points is to adjust the cultivation to the character of the soil. In dealing with light soils it is not advisable to disturb the sub-soil to any extent or to work the soil deeper than four inches. Keep the soil full of vegetable matter, so as to increase its water-holding power. In heavier soils, however, it is necessary to disturb the sub-soil to a greater depth than four inches. The soil should not be turned up for a greater depth than five inches, but provision should be made by means of a sub-soiler for disturbing the soil below the level. I am an ardent believer in shallow plowing and in uniformity of cultivation, whether it be deep or shallow. One of the advantages of this method is that you do not turn the weed seeds down below the reach of the sun and the air, where they would lie in a dormant condition to come to the surface to trouble you in later years. By shallow plowing you keep the weed seeds near the surface where they will readily germinate and make the work of destruction much easier. Another advantage is that you keep the humus in the surface soil. The keeping of plenty of decaying vegetable matter near the surface is one of the most important advantages from the surface cultivation.

I would employ the clover plant as one of the chief factors in subsoiling. You all know its value as a nitrogen gatherer, as well as a subsoiler. I want to keep the soil as full of vegetable matter as possible, and I, therefore, believe in growing and plowing under green crops in the case of light soils, and also in the case of heavy soils if I felt the mechanical texture of the soil would be greatly improved thereby. On lighter soils, where there may be difficulty in getting the clover to grow, I would recommend buckwheat or rye as a means of supplying this humus.

We find that in the fall of the year our time is so much taken up that we cannot give our land as much cultivation as we should like. By a right system of rotation, however, farmers need not do nearly as much plowing in the fall as many have been in the habit of doing. It is not necessary to plow land in the fall after the removal of the cultivated crops as roots, potatoes, corn, etc. The surface, however, should be worked with a disc harrow or a spring tooth cultivator. In that way you do not plow down the manure left by these crops, and thus put it beyond the immediate reach of the crop to be sown. By this shallow cultivation you leave a loose soil spread like a blanket over the surface, which prevents the escape of the moisture. I would not even plow after the removal of the corn crop. The roots of the corn plants will rot more quickly if left on the surface than they will if they are plowed down. By this means the plant food rendered available by the cultivation of the hoed crops will be left on the surface to aid the growth of the plants during the following season. No matter on what class of soil we have our hoed crops it does not pay to plow our land. We usually get better catches of grass seed if we leave the root land unplowed. I believe it is an advantage, and especially with heavy soils, first to cultivate the surface in the fall of the year and then to rib up with a double mould board plow to preserve the soluble plant food and to give the air, water and frost a better chance to change the unsoluble plant food into an available form. I consider it advisable to keep the soluble plant food as well as the weed seeds near the surface of the soil.

LUCERNE GROWING.

By F. C. Elford, Holmesville.

In his address Mr. Raynor referred to clover as a very profitable plant. Everyone here will agree with him so far as red clover is concerned, but when it comes to lucerne perhaps the number is limited. If on our farm we had given up growing lucerne fifteen years ago simply because we met with obstacles, we should not have been in favor of the plant to-day. In our section we have given up the growing of wheat to a large extent. We want a plant that we can most quickly convert into pork, beef, etc., with the least possible outlay of money and work. I believe lucerne is one of those crops. The longer we grow it the better we like it. Our plan is to follow a hoed crop. We sow twenty pounds to the acre and plant with a seeder. We usually sow with barley. Frequently at harvest when we cut our grain the young clover stands from fifteen to twenty-four inches high.

We do not allow a hoof upon our clover that fall or perhaps the next year, but sometimes we pasture some the second year. As a pasture crop lucerne is unsurpassed. We have had no trouble with bloating, but there is some danger of pasturing it a little too closely. As a hog pasture we have never seen its equal. I read of a man who had twenty acres of lucerne and turned 200 pigs on it in the spring, giving them nothing in addition but water. He sold them directly from the lucerne, and found on weighing them that they had made an average gain of 100 pounds. That would yield a very nice profit. We have followed partially the same system on a smaller scale. Some years ago we took a careful estimate of the cost of producing a pound of pork under this system. We allowed eighty pigs on five or six acres, giving them whey and water. Three or four weeks before marketing we put them in and fed them a grain ration. Summing up, they cost us 2 1-2 cents a pound, allowing for rent of land and everything.

As a soiling crop lucerne is excellent. We have frequently commenced cutting by the first or second week of May. It is then from eighteen inches to two feet high. We continue cutting three or four times during the season, the total crop yielding about twenty tons of green fodder to the acre.

For milch cows it is a particularly good feed—so good, in fact, that I have found you cannot materially increase the milk flow by adding anything to the lucerne ration. Give the cows all the lucerne they will eat and plenty of water, and you will get all the milk they are capable of producing.

Lucerne is more independent of the rain fall than any other crop I know of. Some will admit that lucerne is all right as a soiling crop, but maintain that it is no good as a hay crop. We have heard that many times. We have had it average six tons to the acre of well cured lucerne hay. My father was very conservative, and always said he did not like anything but timothy hay for horses. We made an experiment. Our experience was such that we would just as soon feed well cured lucerne hay three times a day to our working team as we would timothy hay with three gallons of oats per horse added, and that they will keep in just as good condition.

For young stock it has no equal so far as we can find out. For hogs it is a cheap food during the winter season, cutting it up and soaking it well. I have heard the objection that cattle and horses will not eat it, but I venture to say that there is not a head of stock in our stable but will turn from meal to eat that hay.

We have perhaps been the pioneers in lucerne growing in our section. I am safe in saying that hundreds have come to see it. I believe there will be more lucerne hay harvested there next summer than red clover. I do not mean because more lucerne has been sowed, but the hot, dry summers we have had recently have been very destructive to the young red clover. More than half the red clover sown in our township amounted to nothing, whereas I do not know of one failure with lucerne. We can hardly afford to raise red clover, it is too risky a crop. I believe that lucerne has

trebled the yield of hay on the farms where it has been grown. In Huron the average hay crop is a little over a ton to the acre; I believe it is the same all over the Province. Even supposing it only doubled the hay crop, that would mean increasing the yield of hay in Ontario by 3,000,000 tons, which at $10 per ton would total $30,000,000. True, the seed is expensive, but a field will continue to give crops for eight or ten years.

Q.: I find that it heaves out somewhat seriously.

Mr. Elford: It will heave sometimes on knolls that are not covered with snow, but not as much as red clover.

Mr. Fraser: Have you any difficulty in getting a stand?

A: Yes, a little at the start. We as a rule sow it with a nurse crop of barley or oats. I cannot say that we have ever tried sowing it alone, although others have with very good results.

Mr. Tillson: I saw some sown on a sand hill in Bruce. It was sown thick. It was cut five times and was thirty inches long.

FARM FENCES.

By Duncan Anderson, Rugby, Ont.

This is a subject that has often been spoken on, but it is one of the most important that the farmers have to deal with. My experience in farming shows me that by the time I hire my help, keep up my buildings and machinery, pay my taxes and insurance, and keep my fences in repair, the difficulty that faces me is not how to keep my family but how to keep my farm. I must cut off everything possible so as to reduce my expenditure. I think we have an opportunity to do that in the matter of fencing. I have taken the trouble to get up a little estimate showing how much the fences of the Province are worth at the present time. There are in round figures 24,000,000 acres of assessed land in Ontario. Of this 8,000,000 is in bush, 3,000,000 in swamp or marsh, 10,000,000 acres are arable land, and 3,000,000 acres permanent pasture. If we take all the land that is fenced and divide it into farms of 100 acres each, we have 130,000 farms. The fencing for that number of farms is a very important item. If we provide fences for the line and roadway, for dividing the land into 12 1-2 acre fields, for enclosing the paddock and orchard, and protecting the lane, we shall find that it will require all told 1,000 rods of fence for each farm, or a total of 130,000,000 rods of fence. I value that at 40 cents per rod—perhaps 30 cents would be nearer—putting it at that, we have $39,000,000 worth of fences in the Province. It would take all our cheese, butter, heavy horses and our exports of bacon hogs for one year to build these fences. If a farmer has one hundred acres divided into eight fields, etc., and all fenced, he cannot remodel his fences, using the old rails and the balance wire for less than $500. The life of the fence will not be more than 20 years. Interest on that amount would therefore be $400. It to $1,000 for fencing a 100-acre farm, or say $50 a year.
will cost at least another hundred for repairs in that time. So that it will total up

The question is, can part of this cost be avoided? I think it can. If I were living in southwestern Ontario, say in the Lake Erie counties, I would not have an inside fence on my farm at all. Inside fences, after all, are only for the protection of the growing crops against cows, etc., in the pasture field. Does it pay to pasture land is a question that ought to be discussed. The pasture season is so short that it might pay better in half Ontario to grow green crops for the cattle instead of depending on pasture. If we could do away with inside fences even on half the farms of Ontario we could reduce the total outlay for fences by $12,500,000. Even when this is done, the matter of fencing is still a most important one as regards cost, and the question of the sort of fence to be used requires serious consideration. The day of the old snake fence is past. In my opinion a straight rail fence with posts every eleven feet gives the best satisfaction. When we come to wire fences the question of choice is a serious one, but I think it should be of woven wire.

THE VENTILATION OF FARM BUILDINGS.

By E. C. Drury, B.S.A., Barrie.

In speaking on this subject I feel that I am laboring under one disadvantage, namely, that the subject is, comparatively speaking, a new one. Until ten or twelve years ago our stables required, in the great majority of cases, no ventilation; in fact, the chief aim was to reduce the ventilation. The wind came in and did all the ventilating that was needed, and the cattle could testify that the ventilation was very complete indeed. But of recent years the construction of our stables has been entirely revolutionized. Stone stables have given place to wooden ones, until they are now the rule. Closer and warmer stabling of animals is the result, and the tendency has been to run to the other extreme, and do away with ventilation altogether.

I may say at the outset that no perfect system of ventilation has yet been adopted. We are still in the region of theory to a large extent, because so little experimenting has been done with different systems of ventilation. I will attempt to lay down some of the laws that govern the subject, leaving you to apply them in your own practice.

First, as to the aim of ventilation. We know that all animal life depends upon the using of oxygen. We require pure air and air containing its full allowance of oxygen in order to keep up the vital energies. To secure this is the first object. But in addition to this, we know that all animals exhale from their lungs and skins a poisonous gas, and certain organic substances, which if allowed to remain in the air and putrify, gives rise to foul smells. It is therefore necessary to rid the air of carbonic acid gas exhaled from the lungs and of the particles exuded from the skin of the animals. The gas exhaled from the lungs diffuses very readily through the air and is soon distributed all through the stable in very equal quantities. The organic substances are solid and tend to settle to the bottom of the stable, so that there we find the most impure air.

The question we have to consider is, how are we to produce a circulation of air in the stable, leaving as much of the heat as possible, and yet supplying pure air from the outside. There is one law only that we can follow, namely, that warm air rises and cold air falls. We have to depend on that one force. Should the fresh air be allowed to enter at the top or at the bottom of the stable? I believe it is better to admit it at the top. If it is admitted at the bottom it does not mix readily with the air of the room, but forms a cold layer across the bottom of the stable, and does not accomplish its purpose. My suggestion therefore is that it should be supplied by a flue above the heads of the animals so that they may be permitted to breath the air before it becomes contaminated.

The next point is, how are we to remove the foul air? I believe the uniform practice where flues have been used is to have the opening at the top of the stable. I do not know but that, personally, I am of the opinion that it would be better to have the flues arranged to take in the foul air at the bottom. If the air passes out at the top, we get rid of the carbonic acid but not of the organic impurities that have settled to the floor. Besides this, the heat is carried away also and lost. But if we wait till this impure air at the top of the stable is cooled off by contact with the fresh air from outside and falls to the bottom of the stable, we shall then be able to remove it, together with the organic impurities, and still retain the heat in the stable.

I believe this is the correct theory of ventilation, but it is only a theory. Where the stable is not overcrowded I think that the ordinary openings along the wall will answer sufficiently well, but where every portion of the space is utilized it will be an advantage to adopt some proper system so that the pure air may go where we want it, and the impure air be got rid of in a proper manner.

HOW TO PRODUCE FRUIT OF HIGH QUALITY.

By W. N. Hutt, B.S.A., Southend.

In order to grow fruit of a high quality it is necessary to begin right. It is the same with fruit as with live stock—we must get the right breed and the right individuals at the very start. This is an important point. It is just as impossible to raise good fruit without considering this as it is to raise such animals as we see at the Winter Fair, now being held here, from inferior stock. It is a little difficult to secure the right kind of nursery stock, because we have to obtain it through dealers. It is therefore desirable to deal with a nurseryman who has considered this point. You will all have noticed that you may plant two trees of the same variety in your orchard, and give them precisely the same attention and treatment, and yet one will bear much better fruit than the other. It is the individuality of the tree. We have to select trees that will give the best individual results. If you cannot be sure of getting this from the nursery, you had better set out Talman Sweets and topgraft later from trees you are quite sure of.

Then it is desirable to get the trees to work as soon as possible. It is just as important that they should not be stunted, as it is important that young beef animals should not be stunted. A tree must be kept growing from the start. In order to effect this we must give good cultivation from the start, and not allow the tree to struggle for years until it begins bearing, and then give it cultivation. This is wrong; we must give the tree attention from the beginning. We also want intensive cultivation. Cultivate thoroughly and often. Clean cultivation is not necessary from the beginning. For the first year or so you may put in any hoed crop such as corn. This will keep the ground constantly stirred. Corn will also provide the shade which the young tree has been accustomed to in the nursery.

Provision should also be made for cover crops so far as possible. What I mean by that is green crops started in July or August, according to the locality, to cover the ground during the fall. These cover crops should consist of clover, vetches, rape or buckwheat. Perhaps the vetch is the best of all. The clover crop may be sown with the last cultivation of the corn.

As soon as the tops of the trees begin to spread, we may know that the roots are spreading also at about the same rate. It is then necessary to take all other crops out of the orchard and give the whole of the land to the trees. Cultivation, however, must be kept up till nearly autumn in each year, and a cover crop sown then to be ploughed under the following spring.

Cultivation should not be continued on into the autumn. If cultivation is kept up too long, the trees will tend to grow too much, with the result that the wood will be soft and will not ripen up. It is therefore necessary to stop cultivation about the latter part of July or the beginning of August, according to the latitude.

In growing apples you will probably notice that when the trees are in full leaf they take up a great deal of moisture from the soil, and that the soil dries on the surface. It is, therefore, necessary to cultivate the surface so as to retain as much of the moisture as possible. When the apple is growing the tree draws very heavily on the moisture of the soil. If the tree cannot get sufficient moisture small apples will result.

It is necessary to have the trees well pruned. This will allow the light and air to get in, so as to properly ripen and color the fruit. In pruning, during the early years you should avoid checking the growth. The object should be to direct the trees rather than to check them. There should be plenty of foliage on young trees.

Spraying is very essential. We cannot raise good fruit in this country without spraying. It is also essential to have your mixtures in diluted and not in concentrated form.

THE PROPER PACKING OF FRUIT.

By Elmer Lick, Oshawa, Ont.

Mr. Hutt has told you how to grow good fruit. It is much easier and more satisfactory to pack apples when you have good fruit to start with. If you follow Mr. Hutt's advice and grow good fruit, the packing is a comparatively easy matter. Still, skill and judgment are required even in preparing the fruit for the market. The first thing to consider is what sort of package should be used. The finer varieties of fruit should be packed in boxes. When barrels are used the best fruit is injured by overpressing.

The fruit must be picked at the right time. This year a lot of the Northern Spys have been picked so early that very serious loss is the result, because the warm weather has ruined their keeping qualities. The question of grading is too large a one for me to deal with here. Great care is necessary in grading, and the work will be rendered much easier by having a large quantity of the one variety. In facing the barrel pick out fruit that is fairly representative of the contents of the barrel. Place the smaller apples on the outside and the larger ones in the centre.

The picking should be done very carefully, care being taken not to bruise the apples by dropping.

Care must be exercised in jarring or shaking the barrel in filling, so as to get the contents well shaken and to avoid slackness and at the same time not bruise the fruit. This is best accomplished by giving a trembling motion to the barrel. In hauling to the station a spring waggon should be used, otherwise the fruit may be bruised in that way. The more the producer can pack his own fruit the better it will be for the trade.

After picking the fruit should be put inside, where it is dry. The barrel or box should, as a means of avoiding mistakes, be stencilled with the name and address of the packer, and the grade and variety of the fruit.

Care must be taken all along the line if we are to succeed in gaining for our fruit such a reputation as its true character warrants. When this is accomplished we may expect that the growers and all who are connected with the industry will receive a full and just return for their labors.

ONTARIO FAIR SYSTEM.

A paper was read by Mr. F. W. Hodson, Dominion Live Stock Commissioner, Ottawa, in which he reviewed carefully the past method of work of our agricultural societies, and outlined what he considered an improved system of work. He was supported in this by Mr. H. B. Cowan of Ottawa, who had been intimately associated with the work carried on in 1901 by the fairs of the Ottawa Valley.

A lengthy discussion of the paper took place. As this subject will be more fully discussed and reported upon at the meeting of the Canadian Association of Fairs and Exhibitions, to be held in Toronto in February, 1902, it is considered advisable to reserve the report of this paper and discussion at the Union meeting, and to give the same in full in the other report to appear later in the year. Copies of this Fair Association report will be sent to all members of the Experimental Union and to all others desiring the same.

AGRICULTURAL EXPERIMENT STATIONS AND KINDRED INSTITUTIONS IN EUROPE.

By C. A. Zavitz, B.S.A., Experimentalist O.A.C. Guelph.

Having been connected with the experimental work of our Agricultural College for fifteen years, and having visited upwards of twenty Agricultural Experiment Sta-

tions in Canada and the United States, I had a desire to visit some of the European stations in order to study the work which they are doing, and to gather all the information which I could regarding the agriculture of some of the European countries. I, therefore, applied to the Minister of Agriculture for permission to go to Europe last season. A leave of absence for four or five months was granted, and on the 4th of May I left Guelph en route for Europe. I landed at Liverpool and went directly to London, where I remained a few days and then crossed over to France.

Agricultural Education in France. I visited a number of the best agricultural schools and experiment stations in France, especially in and around Paris. In studying the agricultural work of France, the special feature which impressed me the most forcibly was the comprehensive system of agricultural education carried on in that country. The agricultural instruction forms a very important part of the general system of the public education. Nearly 4,000 of the rural primary schools of France have gardens or demonstration fields attached to them, which are used for object lessons in connection with the courses of instruction. In the rural elementary schools the pupils are taught the elements of the natural and the physical sciences as related to agriculture. This instruction is furnished in these schools from the time the boys and girls are seven years until they are thirteen years of age, and is divided into the "Elementary Course," the "Middle Course" and the "Higher Course." After the pupils are over thirteen years of age they take the "Advanced Course" in the superior primary schools. Systematic instruction is taught in the Normal Schools along the lines of field agriculture, live stock, and rural economy. It will thus be seen that agriculture forms an important place in the curriculum of the public school system of France.

France not only teaches agriculture in connection with her public school system, but she also has a great many institutions devoted entirely to the teaching of agriculture. The highest agricultural institution in France is the Agronomic Institute, located in Paris. At this institution students are qualified for taking positions as professors in the agricultural schools, as directors of agricultural experiment stations, as agricultural investigators, as chemists, engineers, agriculturists, etc. It is stated that about 90 per cent. of the graduates of the Agronomic Institute follow occupations along agricultural lines.

There are in France nine national schools of agriculture. The most popular, and perhaps the best equipped of these national schools is the one located at Grignon near Paris. This school is very well equipped with land, live stock and laboratories. About eight acres are devoted to experiments with varieties of field crops, application of fertilizers, etc. The national agricultural schools are more practical in their teaching than the National Agronomic Institute. The courses cover periods of from two to two and a half years. The majority of the students, after graduating from the agricultural course, either become teachers of agriculture or follow practical agricultural work.

There are between forty and fifty practical schools of agriculture throughout France. As a rule, there are from 100 to 350 acres of land attached to each school, and the course is made both practical and theoretical. At one time there were also a large number of farm schools throughout France, but at the present time the number is much less than formerly, and there are now only about twelve of these schools in existence. The objects of the farm schools are very practical and are calculated to teach the peasantry of France the details of practical operations on the farm.

After spending about two weeks in France in visiting agricultural schools, agricultural experiment stations, the seed farms and trial grounds of Vilmorin-Andrieux & Company, the mushroom caves of Paris, etc., I entered Switzerland by way of Geneva. The tourist when passing through this most delightful country, in viewing the beautiful scenery of the lakes and mountains, in visiting the glaciers and listening to the avalanches, but little imagines that in this country of wild scenery there are no less than eleven schools of agriculture—seven in which the German, three the French, and one the Italian language is used. It was my privilege to visit three of these schools. Of the different lines of agricultural work in Switzerland I was most interested in that of the investigation of seeds.

Seed Investigation in Switzerland. There are at present upwards of one hundred seed control stations throughout the different countries of Europe. Some of these are devoted to seed control exclusively, while others combine seed control work with that of other lines of investigation. About thirty-five years ago Dr. F. Nobbe of Tharand, Germany, offered to assist the farmers in the selection and the purchase of seed. This was the start of systematic seed investigation in Europe, and Dr. Nobbe has the credit of being the pioneer in this great movement. The first seed control station in Austria was established in 1870, in Denmark in 1871, in Belgium in 1875, in Switzerland in 1876, and in Russia in 1876. One of the most noted seed control stations of the present day is the one located at Zurich, Switzerland, which is under the directorship of Dr. Stebler. At this station seeds are tested for about one hundred Swiss seedsmen, and also for various seed firms in other countries. Thousands of samples are tested annually. The station has several experiment fields, a garden and a greenhouse for practical seed tests. There are several germinating chambers in the laboratory, which can be regulated to different temperatures as required for the germination of different kinds of seeds. There are machines for sifting the seeds, for scratching the outer coats of the hard seeds, etc. The seeds are tested for germination and for purity, and the results are reported on cards which furnish printed information as well as the exact results of the tests.

Scientific Investigation in Germany. I visited ten Agricultural Experiment Stations besides a large number of other agricultural institutions in Germany. I found so much of interest in the German institutions that I spent a very busy month in moving about and studying the German methods of operation. It would be useless for me to even attempt to outline the excellent work is being done by many of the German Agricultural Colleges and Stations. I was certainly impressed with the large amount of scientific investigation which is being carried on along definite lines for long periods of time by many of the German Experiment Stations. The German investigators seem determined to follow up the lines of investigation which they undertake until they secure results which will furnish new information to agricultural science.

Beet Sugar Investigations in Germany and Austria-Hungary. There are about four hundred beet sugar factories in Germany and two hundred and thirty in Austria-Hungary. When in Berlin I visited the laboratory of the beet sugar makers' union of Germany and when in Vienna I visited the Chemical Experiment Station of the Central Society for the beet sugar industry in the Austrian Empire. These are not Government institutions, but are supported by the beet sugar associations. The Austrian laboratories fill a very large and substantial building and they are well equipped with costly apparatus. At each station a large staff of scientists are employed in carrying on investigations in connection with the growing of sugar beets and with the manufacture of beet sugar. After I had spent as long in Germany and Austria-Hungary as my time would allow, I passed into Holland.

Good Home Market for Farm Crops in Holland. There are five experiment stations in Holland. The three which I visited were situated at Groningen, in Northern Holland, Wageningen, in Central Holland and Maastricht in Southern Holland. In passing through this interesting country I found dotted here and there throughout the whole land factories erected for manufacturing farm products into articles of commerce. Starch was being manufactured from potatoes, sugar from beets, paper from straw, fibre from flax, etc. These factories supplied a ready home market for many of the farm crops which are grown in abundance on the rich, well cultivated farms of Holland. After leaving Maastricht in Holland a person soon crosses the border and passes into Belgium, the most thickly populated country in Europe.

Intensive Farming in Belgium. In Belgium I visited three agricultural experiment stations, the principal one being at Gembloux, where some very good work was being done. I was greatly impressed with the possibilities of soil production from what I saw in Belgium. Every available portion of land appeared to be in use, the cultivation was thorough, and the crops were excellent. The average density of Belgium is about five hundred people per square mile, and the average farm is composed

of less than eight acres. This accounts for the intensive form of agriculture carried on in that country.

Agricultural Work in Great Britain and Ireland. After returning from the continent I spent about two months in England, Scotland, Ireland and Wales. I visited all the principal Agricultural Colleges and Schools as well as the agricultural experiment stations throughout Great Britain and Ireland. The work at the Rothamsted Agricultural Experiment Station and also that of the Royal Agricultural Society of England was of special interest. The establishment of institutions in Great Britain for the purposes of agricultural education and agricultural investigation are mostly of recent date. It has been within the last three years that the Government has given direct aid to this work. There is a great awakening throughout Great Britain along the lines of agricultural education, and rapid progress is being made at the present time.

Conclusions from the Trip. From the complete and comprehensive system of agricultural education given in some of the European countries we have much to learn. In carefully systematized and thoroughly conducted scientific research directed along special and well defined lines and continued for long periods of time, some of the European Experiment Stations were pioneers in the work and are leaders to the present day. In the investigation of seed, the improvement of farm crops and the production of beet sugar, in the economical use of land and the thorough cultivation of the soil, in the management of the forests and the construction of good roads we can also obtain valuable lessons from the people of Europe.

Europe is doing much for agricultural science; America is doing much in the application of agricultural science to practical agriculture. I could not find so close a relationship between the scientific and the agricultural world in any of the countries of Europe as I find in America, and especially in our own Province of Ontario. In higher agricultural education for farmers' sons, in Agricultural Experiment Station work for the farmers, in co-operative experiments in agriculture by the farmers themselves, and in a complete and comprehensive system of Farmers' Institute meetings, I found nothing in Europe equal to what we have in Ontario. Our farmers take a keen interest in the application of those methods suggested by science or by practice which tend toward the advancement of agriculture. Generally speaking, the farmers of Ontario own the farms which they manage and hold a position among their countrymen which is good socially, intellectually, and financially.

ADDRESS.

Hon. Sidney Fisher, Minister of Agriculture, Ottawa, Ont.

I am glad to know that in the person of Lord Minto we are welcoming here to-night one who, outside of his official capacity, is greatly interested in agriculture, one who has large estates in the south of Scotland, where the tenants and the farmers of the land are well aware of the interest which their chieftain takes in their agricultural works, and in the many conversations I have had with his Excellency about the fields and farmers of Canada I have always found an extreme interest in a subject which I, as Minister of Agriculture, believe to be the one great interest of our fair Dominion. If next summer Lady Minto comes here you will find that, as Lord Minto is interested in farms and farming, Lady Minto knows all about the gardens and lawns and trees and shrubs, and will be able to take a most lively interest in what she sees on this beautiful spot.

But may I for a moment go on to other things. I assumed a few minutes ago the presence of the representative of the King here to-night. I was glad indeed to obtain the acceptance of the invitation by Lord Minto to come here, for I know from a large experience of this Dominion, from having attended all the great agricultural gatherings of the Dominion for many years—I know that this gathering in the month of December in the City of Guelph is the most important, the most educational, the

most magnificent gathering of farmers which the farmers of Canada know or will know for many years to come. In the Guelph Fat Stock Show we not only have all the specimens of the skill of our breeders and feeders shown in splendid numbers, shown in splendid quality and excellence, to those who come to see them, but we have the splendid education of this work which goes on at this Fat Stock Show by which and through which those who attend it are able to carry away a greater intelligence and greater knowledge of the things which are on exhibition here, and all the ways and means by which those animals have been produced. There are many live stock shows through the country, there are many live stock shows in the old country, and in that of our neighbors to the south, but I have yet to learn of such where the educational feature is introduced which is introduced into this Guelph Fat Stock Show. I want, also, in this connection to tell his Excellency that, in coming here to-night to meet the present students and the old graduates of Guelph College he is meeting the men who are to-day and will be for many years in the future the backbone of this Province of Ontario. You are mostly the sons of the farmers of Ontario, and the farmers of Ontario, wherever they have met in competition with the farmers of other parts of the world or Dominion have shown that in this small Province, in this small small area of the great North American continent, are produced and to-day exist the best farmers and breeders to be found on this continent. I say this with full deference to my friend on the right, Dr. Wiley, with full deference to these gentlemen of the United States who have come amongst us, I say it with full consciousness that when Americans want good stock to improve their herds, they come to Ontario, and when Americans want bright young men to go into their Agricultural Colleges to teach their young men how to farm, they come to Guelph College to get them. I know that the men who have gone through this college have carried its name widely through the world. Some of them have gone to the antipodes, some have gone across the sea, there to help our rivals in the old land; some of them have gone to the United States and are there employed in teaching them how to rival us in our work. This work is now being carried on in a way and by a system which I think is most excellent. The students of this college not only go back to their farms and their work in the practical work-a-day affairs of life to live the problems which they have studied and learned here, but they also form a large proportion of that great staff of institute workers who are constantly moving through the Province of Ontario and Dominion of Canada to teach our young men the greater truths and higher principles of agriculture, and it is largely through the influences of this college and its work that agriculture has attained to a higher plane in the country in which we live. In farms and farming there is scope for the highest education, and farmers may be just as well informed and as great gentlemen as those in any other profession in the land. The farmer was supposed to be a mere clodhopper, a hayseed, a drudge, but to-day we understand and know that the men who are succeeding best on the farms of Ontario are the best educated, the best informed and the brightest of the men who have been through the higher education of the land. This, then, is a thing on which the farmers are to be congratulated. I am especially proud of this fact in my capacity as Minister of Agriculture, and if there is one thing more than another which I hope to promote a little, it is to improve the status of the men engaged in agriculture in our land, and to let them understand, and the rest of the community understand, that they are the equals of any in the land, and that their influence and work is of the greatest benefit to the whole country of which we are so proud. It is not unreasonable to think so. If you examine our trade and commerce you will find that the largest proportion of it is the commerce of our fields and flocks. If you examine the wealth of the community you will find that it is produced from what is wrung from the soil of our country by the men who dwell upon that soil. If, then, we can increase the intelligence of those laborers and give them knowledge of how best to do their work, we are doing more to advance our country than any others who may be engaged in any work.

I am glad to see on my right hand, a professor of the Agricultural Department at Washington. I understand that last night you heard him in this hall, but I was charmed

this afternoon to hear from his lips one of the most practical addresses on an agricultural subject, which I have ever been privileged to hear. I am glad to welcome one of our neighbors from the south. Being of the same race, speaking the same language, having the ties of relationship so closely bound together, lying alongside of each other as we do on this American continent, and sharing it between us, it is well that we have visitors from that land amongst us at such gatherings as this. It is well that we should tell them how much we value the assistance they give us in our work, and tell them how gladly we would have them share in anything we can do to help them in their work. We, in Canada, lie, as a portion of the great British Empire—an outlying portion, as far as the heart of that empire is concerned—but we lie alongside of the other half of the English-speaking race to-day comprised in the United States, and it is one of the best works for the future of this world, that the people of Canada to-day are occupying that position, enjoying that advantage are the link that binds together the two portions of the British race, and keeps them in sympathy with one aspiration, in those things which are working for the good of humanity, and which will make each and both of them do more for the progress and humanity of the world than each without the other could possibly do.

You know, sir, I have always praised this college whefever I have been. I was glad to-day to hear Mr. Zavitz speak of his tour in Europe. I was specially glad of it because the conclusions he reached were largely the conclusions I had reached, and, therefore, I was able to endorse them and think them very good indeed. I have no hsitation in saying that although in the older lands they are able to spend more money and apply more time to scientific investigation and original research in regard to scientific work, in none of the colleges or organizations in favor of agriculture in those lands are the actual workers on the farms so much helped, so much brought in contact with the truths that are to-day constantly developing in agricultural progress, as the farmers of Ontario are brought into contact with agricultural progress by this means and by your college. The Ontario Agricultural College at Guelph here may be congratulated on the work it is doing and in the advantage which it is to the whole comm"nity.

ADDRESS.

His Excellency the Earl of Minto, Governor-General of Canada.

Mr. Chairman, Ladies and Gentlemen,—I feel that I almost owe you an apology for coming to see Guelph and this great college at such an inclement time of year, but I think I must put some of the responsibility on my next door neighbor, Hon. Sidney Fisher, who is always persuading me to come here to the Fat Stock Show. I hope that at any rate it may not be my last visit to Guelph. I have come here particularly, of course, to see the Fat Stock Show; I have come here to learn. I have heard a great deal of the excellent instruction that is given here, and I wanted to see for myself not only the exhibition of stock, but to learn for myself the system upon which the instruction at your Agricultural College is given. I hope at some future time I may be able to come here with her Excellency, Lady Minto, in the month of June, as your Chairman has suggested—(cheers)—and I suppose I may be permitted to share a sandwich with some of the 30,000 farmers—(cheers)—who come to visit the college annually in the month of June. My time is very much taken up. Last year I was in the Klondike, and this year I was wandering about Cape Breton and Nova Scotia on an official tour. Next year I have to go to the Coronation, a great historical event which one would be sorry to miss, and that will again count me out from paying visits to other parts of Canada. I should like to make these other visits, however, during the remainder of my appointment here. As it happens, I have seen a good deal of the Dominion. I was here, as a good many of you know, seventeen years ago, and formed a great many warm friendships, which I have been able to keep, so that coming here on this occasion is to a great extent a

coming home to me. When my term of office is over, I assure you I shall always look back upon it with feelings of strongest affection.

Your Chairman, Dr. Mills, has alluded slightly to your military capabilities, and what you owe to the old country. As it happened, in 1885, I had a good deal to do with the Canadian soldiers in the Northwest, and I have always stuck up for them and their valuable qualities, and, though I do admit that in a military sense you are placed very well as regards the old country, there is one thing you ought always to realize, one and all, and I cannot say how important it is, that the old country is pledged to defend you with all the forces of the Crown. I will never join in saying that Canada has given nothing to the old country, when we look upon all the high courage she has shown and all the valuable lives she has sacrificed in South Africa.

I hope I may have an opportunity to-morrow of going over the Live Stock Show here. I have some excellent tutors to look after me in Dr. Mills and Hon. Sydney Fisher, and I feel that my visit here will benefit me in the instruction which you are so very well able to give me.

WORK.

By Miss Laura Rose, Guelph, Ont.

My remarks this afternoon will be on a subject common to us all. It is that which is the panacea of nearly every ill that flesh is heir to. That which most effectively and quickly heals the wounded, broken heart, gives confidence to the weak, and keeps the strong from erring. Have you guessed the magic word? It is a short one—one very familiar to us all—the little word "work." Our whole duty is to move, to work, in the right direction. We must keep pace with time or we shall be carried on with it—a dead load. An Italian philosopher expressed in his motto that time was his estate, an estate, indeed, which will produce nothing without cultivation, but will always abundantly repay the labors of industry and satisfy the most extensive desires, if part of it be not overrun with noxious plants, or laid out for show rather than use.

Nothing gives the character so much strength and energy as a definite object. Nothing is more productive of success and happiness than that a person should be in harmony with her work, that she should have the faculty of work, and be able to do it thoroughly and well. Ruskin said, "There can be no healthy thought without labor, and no happy labor without thought." If we, as housekeepers, would put more thought into our everyday work, the drudgery of it would be largely removed.

Many women bewail their lack of talent, and that they can do no great work in this world, and these very women are makers and keepers of homes. What more beautiful mission. What more useful or coveted talent than that of making a home, where rest, peace, and happiness abide. To keep a home well and to make its influence strong for good, is great enough in itself to fill the largest life.

True, some women have an intense appetite for work and they feed it well. They certainly get Kingsley's reward, for he says, the greatest reward of having done well is having more work to do. It is a known truth that only busy women have any time for extra or unexpected work.

Of course, it is part of the very idea of work that it should involve labor and weariness. We need to fully reconcile our minds to this, so as to work with patience and perseverance. There are various helpful considerations. To many women work is a necessity, but in working they are carrying on the order of the world. Without work the world would have been a wilderness, and without work into a wilderness it would soon return.

It is a thought full of incitement and encouragement that we are of use in the world, that we are co-operating towards good. The consideration also arises that while we work our labor returns in blessings to ourselves. We are adding to our culture. We are promoting our own development. Above all, there is the supreme satisfaction of know-

ing that in work we are following the will of God. He condescends to employ us as fellow workers with himself. He has made work a law to himself and has assigned it as a law to us. The highest title which he vouches is that of "a good and faithful servant." Such thoughts cannot make hard work other than hard work, but they will save us from carelessness and indifference and will cause perseverance, cheerfulness and hope.

Oh, all who labor, all who strive,
Ye wield a lofty power;
Do with your strength, do with your might,
Fill every golden hour;
The glorious privilege to do
Is man's most glorious dower.

Then to your country, to your God,
To your own self be true;
A weary, wretched life is theirs
Who have no work to do.

THE EDUCATIONAL VALUE OF SEWING.

By Miss Mary Urie Watson, Principal Ontario Normal School of Domestic Science, Hamilton, Ont.

The school is not the only factor in the education of the individual, that is, in the development of his powers. Everything he comes in contact with contributes. It is carried on in the home, and by society before school days begin, and long after they end. The result of this development is conduct, which is good, bad, or indifferent, according to the influences which dominate the process.

The average father of all ages has desired to see his children climb higher than himself, and to this end he has striven to guide and control the process of their education, during the plastic years of childhood and youth, while they were dependent upon him. This desire brought schools into existence, and out of it have grown the various school systems of to-day. All generations have striven towards the same end, but no two have agreed as to what constituted the best conduct, and the best means of securing it. Therefore, no generation has been satisfied with the educational methods of its predecessors, and succeeding generations will surely try to improve upon ours.

Since, then, improvement is the order of the day, let us consider for a moment Huxley's definition of a good education, "That man, I think, has a liberal education, who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all that as a mechanism it is capable of; whose intellect is a clear, cold, logic engine, with all its parts of equal strength, and in smooth working order, ready, like a steam engine, to be turned to any kind of work, to spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great fundamental truths of nature, and of the laws of her operations; and who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself." In other words, it is the welding of the human clay and spirit into a single power for good in the world. Imagine this country of ours filled with people built on these lines.

Why should we not study as enthusiastically to develop first class men and women as to develop first-class sugar-beets, or first-class stock? Notice Huxley's demand for right conduct as the crowning result of education, then notice how it is to be achieved—by training in youth and by training the physical and moral powers as fully as the mental. If we agree with him, it is evident that our schools must do their share in laying the foundation of such an education, for a large part of youth is spent in them.

Well, you say, but how are we to set about the improving of our schools? What do you do when you seek to improve your house or your stock? Consult the specialists, the men who make that sort of thing their business. Exactly. Then let us do the same thing with regard to our schools. For years the educational specialists have been saying to us, we must weave the home interests more closely into the school interests, and bring the school interests more in touch with the outside world. They have been saying, give the children more than book knowledge and mental discipline, give them an all-round training. Train the body to respond promptly to the mind's order, train the mind to receive its impressions and give its orders accurately, and above all train the will to direct the mind aright. They have been saying, do not depend so much upon books, do not spend so much time telling the children about things. Give them the things, and let them work on them with their bodies and their hands. They will find out more in five minutes than you can tell them in as many hours. They will learn more, learn it quicker, and learn it better. We have been paying heed to the specialists, and are beginning to carry out their ideas. The greatest step in this direction has been the introduction of Manual Training. Henry James says: "It is the most colossal improvement which recent years has seen in education," with its laboratory and shop work, and its work with the homely utensils of pots and pans and needles and thimbles. There are many forms of it—kindergarten work, cord work, paper-folding, clay modelling, basketry, drawing, painting, sewing, whittling, carpentry, iron work, and domestic science. Each has peculiar features which make it especially suitable for certain stages of a child's development, under certain conditions.

I have been asked this afternoon to talk on sewing, which has the needle for its special tool. There are many reasons why it is a good form of manual training for girls of the middle and upper school grades. We women are agreed that it well for a girl to know how to sew. True, in these days of sewing machines and ready-made garments, she may need to sew very little, but she will have to buy, and only sewing experience will enable her to judge whether the quality of the material and sewing in her purchase will yield value for the money expended. Ignorance on these points is costly. The problems of the sewing lessons keep the school and home in close touch, preventing that separation of interests which so often weans a girl from home affairs, and aiding the girls to realize that school life is but a preparation for the fuller home life of the woman. Again, it is one of the forms of manual training easy to introduce into school work. It requires no special room, very little special equipment, and is inexpensive to carry on. Finally, we want sewing in our public schools, not so much because it will help to make our girls more handy and practical for domestic life, and better skilled for certain trades, but because it will help us to cultivate their intellectual powers. Properly taught, it engenders a habit of observation, a knowledge of the difference between accuracy and vagueness, which wrought into the mind remain there as a life-long possession. It confers precision, because, if you are doing a thing, you must do it definitely right or definitely wrong. It gives honesty, for when you express yourself by making things, and not by using words, it becomes impossible to dissimulate your vagueness or ignorance by ambiguity. It begets a habit of self-reliance; it develops a power of facing problems and surmounting obstacles; and it keeps the interest and attention cheerfully engaged and reduces the teacher's disciplinary functions to a minimum.

The choice of work must depend upon the age and capacity of the children. Two things, however, seem certain: First, that sewing should not be given to the youngest grades; the needle requires too fine adjustment of finger and eye muscles for little children; and, second, that finished articles should be made all through the course. A course of sewing with nothing to do but sew on six-inch squares, and stick them in a book, is dreary work. These model squares have their place, but it should not be the chief one.

Methods also differ with the age of the children, and no two classes can be taught in the same way. For the little children, large wool needles, wool, and soft, coarse canvas are the principal materials. The stitch-forms are happily learned in order to decorate small mats and other things interesting to children of their age. Pictures and cloth and fibre samples; demonstration frame and blackboard; talks, and, above all, questions

are pressed into service with the object of securing control of the fingers and cultivating observation and expression. In the older girls, we seek to cultivate their powers of accurate observation, expression, and reasoning ability, together with precision of work.

Probably a brief description of the work in a recent class of mine will illustrate these points. There were thirty, of the grades next the High School. They could have but 36 lessons before going to the cooking class ; most of them knew practically nothing of sewing, but they were expected to show fair samples at the end of the year, and, of course, they wanted to make things. The proposition was made, that if they were willing to study the stitch-forms thoroughly first, they would be able to make small models of the cooking class uniform by the end of the year. They enthusiastically voted to do so.

The first lesson was devoted to getting definitions and terms, because no teacher can do individual work with thirty pupils, and because we had to obtain careful observation and accurate descriptions as speedily as possible. (The description was illustrated with samples of work and the blackboard.) The girls enjoy the lesson, and at the end of it they knew the difference between stitch and space, a line of sewing and a sewing-line, and between straight and slanting sewing. There was nothing dictated, the girls thought out their definitions, guided by questions and tests of the answers on blackboard or frame. In the next lesson we studied cloth—found what it was made of. Now the threads were put together; the difference between warp and woof, and the different kinds of edges, and ended by making a piece of cloth with wool on a card.

The following lessons were given to the study of the stitch-forms : Running, basting, stitching, back-stitching, two runs and a back-stitch, gathering, overcasting, overhanding, hemming, in the order here given. In each case a large sample of the stitch correctly made was studied by the class. They were required to describe it ; to form a rule for making it ; and to make it with colored thread on a small piece of coarse cloth, having stitches large enough to judge of their uniformity. These models were pasted into a book, with the description and rule written opposite, for reference in succeeding lessons. The next lessons were in preparation for construction work. In them they studied and practised similarly cloth-cutting, cloth-folding, and a seam.

Then we made things—a bag, cap, sleevelets, pot-holder, and apron. We had large models and studied them as carefully as the stitch-forms. If there was anything new in the article, e.g., a fell, bias-binding, band, buttonhole, etce., we studied it in detail, and made a model for the note-book. A plan was made of the article, noting measurements, kinds of sewing, etc., as clear as the instructions on a Butterick pattern. Finally, the girls cut and made the article, 1-3 scale, to their own measurements.

The last two or three lessons were given to darning and patching. But here the doing was faced as a problem, which the class solved by the light of experience gained in previous lessons.

The course was carefully graded, so that each lesson was but a step in advance of the previous one, and a preparation for the next. It was seldom necessary to take a piece of work and show with my own hands how it should be done, and the rapidity of progress after the early lesson was passed was surprising.

Many of you will think of modifications necessary for differing classes, especially those needed to prevent the early lessons from being the grind they were in this case. There are innumerable articles which can be made in the school room, if only the teacher can adapt them.

All through I have tried to emphasize the need of a good teacher. A clever seamstress alone will not do. We must have teachers' training here as well as for arithmetic or history, and my hope is that you will encourage those whom you desire as sewing teachers to prepare themselves especially for the work.

THIRTY-THIRD ANNUAL REPORT

OF THE

FRUIT GROWERS' ASSOCIATION

OF

ONTARIO,

1901

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF

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CONTENTS.

	Page
List of Officers for 1902	6
Annual Meeting	7
Committees	7
Report of Codling Moth Committee : Joseph Tweddle	7
Reports upon Fairs and Societies	10
Report of the Committee on New Fruits : Prof. H. L. Hutt	13
San José Scale : G. E. Fisher	18
Resolution *re* San José Scale	25
Report of Committee on Fruit Baskets : E D. Smith. M.P.	27
The Apple Barrel	30
The Method of Grafting : E. Morris	31
Bees and Fruit : Wm. Saunders, LL.D	31
Fruit in Simcoe County : G. C Caston	37
Comparison of Canadian and American Fruits : Prof Van Deman	45
Our Fruits in the British Markets : Prof. J. W. Robertson	48
Financial Statement	53
President's Address : W. M. Orr	54
Fruit Shipments to Great Britain : Prof. J. W Robertson	68
Fruit Shipments to Great Britain : L. Woolverton	75
Freight and Fruits : H. W. Dawson	91
Amateur Rose Growing : J. G. Jackson	94
Fruit Exhibit at St. Louis Exposition : Harold Jones	99
Some Notes on Spraying : J. E. Orr	100
Horticultural Societies : G. C. Creelman	105
Possibilities in Horticulture : C. C. James	109
Address : Rev. A. E. Burke	113
Awards of Medals at the Pan-American Exposition	116
Pruning : W. N. Hutt	117
Quebec Orchards : R. W Shepherd	126
Fruit Marks Act : Prof. J. W. Robertson	128
Report of Committee on Packages and Appliances	140
The Promising New Strawberries : E. B Stevenson	140
The American and Nigra Plums : W. T. Macoun	141
Profitable Grapes : M. Pettit	147
Report of Transportation Committee	147
Our Best Commercial Apples : Walter Dempsey	150
How to Produce Fine Apples : Harold Jones	151
Question Drawer	152
Cold Storage at the Pan-American : Robert Thompson	157
Resolutions	158
Report of Committee on the Fruit Display	159
St. Louis Exposition 1903	160
Pruning	161
Hybridizing Nuts : Arthur Harvey	165
Votes of Thanks	166
List of Affiliated Horticultural Societies	167
Index	168

THIRTY-THIRD* ANNUAL REPORT

OF THE

FRUIT GROWERS' ASSOCIATION OF ONTARIO,

1901.

To the Honorable John Dryden, Minister of Agriculture:

SIR,—I have the honor to submit the Report of the Thirty-Third Annual Meeting of the Fruit Growers' Association. This meeting excelled in attendance and interest any meeting ever held in its history, and furnished an unusual amount of valuable information for fruit growers.

I am, Sir,

Your obedient servant,

L. WOOLVERTON,
Secretary.

GRIMSBY.

* This Association was first organized in Hamilton in the year 1859, under the title of The Fruit Growers' Association of Upper Canada.

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

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Committees.

Executive—President, Vice-President and Secretary.

Board of Control Fruit Experiment Stations—Messrs. W. M. Orr, A. H Pettit, and W. H. Bunting.

New Fruits—Prof. H. L. Hutt, O.A.C., Guelph ; Prof. W. T. Macoun, C.E.F., Ottawa ; L. Woolverton, Grimsby.

San José Scale—M. Pettit, R. Thompson, G. E. Fisher, E. Morris, W. M. Orr, W. H. Bunting, John Wigle, Major Hiscott.

Codling Moth—Joseph Tweddle, E. D. Smith, W. M. Orr, A. H. Pettit.

Journal—G. C. Creelman, T. H. Race, A. H. Pettit

Transportation—H. W. Dawson, Toronto ; R. J. Graham, Belleville ; E. D. Smith, Winona.

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

ANNUAL MEETING.

The annual meeting was held in the Court House, Cobourg, beginning at half-past nine o'clock on Wednesday morning, December 4th, 1901.

The President, Mr. Wm. Orr, in calling the meeting to order, said: I am glad to meet so many of you this morning, and to note that all our officers and directors are with us. Also that we have several gentlemen from our sister Provinces, Quebec and Prince Edward Island, and two eminent gentlemen from the United States. Our programme is very full and interesting, embracing questions of great importance to the fruit-growers of Ontario. Prominent among them is the question of fruit packages, and another, that of the transportation of fruit, and these, I am sure, will receive your best attention. Our object is to make progress all along the line.

The Secretary read correspondence from S .C. Parker, secretary of the Nova Scotia Fruit-Growers' Association, expressing the hope that there might be an exchange of visiting delegates; from Rev. A. E. Burke, of Alberton, P.E.I., expressing the hope of being present at the meeting; from Prof. F. A .Waugh of Burlington, Vt., accepting the invitation to address the meeting; from D. W. Beadle of Toronto, the first secretary of the Association, expressing his thanks for the honorary membership conferred upon him; from Chas. Lawrence of Collingwood, secretary of the Georgian Bay Fruit-Growers' Association, with regard to closer affiliation with the Provincial Association; from the Hon. John Dryden, Minister of Agriculture, regretting that other engagements would prevent his attendance; from W. W. Dunlop, secretary of the Quebec Pomological Society, giving the names of R. W. Shepherd of Montreal, and N. E. Jack of Chateauguay Basin, as delegates from that Society to this meeting; also letters from Orillia and Walkerton, inviting this Association for the next annual meeting.

The Secretary read the letter from Mr. Wellington at New York expressing his continued interest in the Association, and his willingness to exert himself in the interest of fruit growers, if continued upon the Board of the Industrial Fair.

COMMITTEES.

The President announced the appointment of the following committees :

Nominations—M. Pettit and T. H. Race (by the President), H. J. Snelgrove, J. S. Scarff and H. Jones (by the meeting).

Fruit Exhibit—Professors W. T. Macoun, F. A. Waugh and E. Morris.

Resolutions—T. H. Race, H. Jones, and G. C. Caston.

New Fruits—Professors H. L. Hutt, W. T. Macoun and L. Woolverton.

REPORT OF COMMITTEE ON CODLING MOTH FOR THE YEAR 1901.

By Joseph Tweddle, Stoney Creek

Pursuant to the amendments suggested in the report of your committee a year ago and adopted by the Association, namely :

1st. That all trees mentioned in the Order-in-Council be scraped clean of all loose and rough bark, thus destroying all hiding places of the larvae except the band.

2nd. That only trees bearing fruit be so scraped and bandaged.

3rd. That provisions be made for the destruction of the larvae of the winter brood, which provisions were not contained in the original Order-in-Council. Your committee subsequently arranged to meet the Hon. Mr. Dryden, Minister of Agriculture, and ask that such amendments be made in the Order-in-Council and upon the recommendation of the Minister of Agriculture. The committee in council repealed the original order and passed the following:

Copy of an Order-in-Council approved by His Honor the Lieutenant-Governor, the 25th day of April, A. D. 1901.

Upon the recommendation of the Honorable the Minister of Agriculture, the Committee of Council advise that the Regulations for the Prevention and Destruction of the Codling Moth, made by Order-in-Council of 24th May, 1900, pursuant to the provisions of the Noxious Insects Act (63 Victoria, Chapter 47) be repealed, and that the following be substituted therefor:

1. It shall be the duty of every occupier of a lot within the municipality, or if the land be unoccupied, it shall be the duty of the owner of such lot, after receiving notice as provided in the Act, to scrape all rough bark and all loose bark around wounds from all trees mentioned in this clause, and to place bands (as hereinafter described) upon all bearing apple trees and pear trees located upon said lot, and such work shall be completed to the satisfaction of the Inspector not later than the 10th of June each year.

2. The bands shall consist of the device known as the "Expansive Tree Protector," or shall be made of "burlap" or "sacking" or equally heavy and otherwise suitable material, and shall not be less than four inches in width and of two or more thicknesses, and shall be securely fastened at a convenient point between the crotch of the tree and the ground.

3. Except where the Expansive Tree Protector is in use, the occupant or owner shall have the bands removed and inspected, and all larvae therein destroyed, and the bands replaced, at intervals of not more than twelve days, between the 20th day of June, and the 20th day of September each year, and once each year between the 10th of November and the 10th of May following.

J. Lonsdale Capreol.

The fruit-growers of the Tp. of Saltfleet, County of Wentworth, then waited upon its council board and again asked that a new by-law be passed in conformity with the new Order-in-Council, and upon which the board made the necessary change and appointed and instructed three inspectors to carry out the enforcement of the provisions of the Act and its regulations by said Order-in-Council.

This being the only municipality known by your committee to have undertaken the enforcement, as above mentioned, and believing such enforcement and its results, so far as achieved, to be of interest to the members of this Association and the public at large, we herewith report in accordance, and we have to say that the season has been an unsatisfactory one in regard to the climatic conditions applying to the fertilization of the bloom. The continued rains and foggy weather during nearly the whole period of apple bloom permitting of only a light set of apples; but experiment with pears, these having bloomed earlier and under more favorable conditions, and set a good crop, led to a somewhat unfavorable opinion as to the necessity of the work. Apple-growers, with little or no crops, showed but comparatively little interest, while others, more largely interested in pears, and with promising crops, took a lively interest in the work.

The inspectors hesitated to enter upon their work, and even the council board were undecided, and not until a deputation of growers again waited upon them did they decide to go on with the work. A fairly energetic inspection we believe had the effect of persuading nearly all the growers in the commercial orcharding section of the township to carry out the necessary scraping and bandaging of their bearing trees. Some few contrived to evade the law, but in the stock and grain-growing parts the inspectors found so few apples set that it was generally concluded that they were not worth the cost of inspection, not one tree in 1,000 having more than a sprinkling of fruit, and scarcely any had that. The inspectors report that after the trees were bandaged they made such limited examination of orchards where negligence might be expected as to satisfy them that the work was generally being carried out in a fairly satisfactory way, and your committee are of the opinion that the fruit-growing public of the township are on the whole favorable to a further test of the workings of the Act and its regulations for another year, especially under ordinary conditions of climate and an ordinary crop.

As to results of the present year's work, we find it difficult to make any definite statement as to the reduction of the loss by the pest. The moth was very prevalent early in the summer, due no doubt to some of the larvae from the large crop of the previous year escaping and all gathering upon the very limited crop of the present season; and during the operations of the first brood it became apparent that any neglect in destroying it would result in the loss of the crop. As many as fourteen larvae were found in one apple, but the month of August being one of more than ordinary low temperature, the second brood seemed to be greatly reduced, and where thorough care and treatment were given, enough apples were saved to bring paying returns at present high prices; but where neglected it is quite apparent the crop was lost. Just how much of the crop saved was due to the cool August weather, and how much due to care, it is difficult to judge.

In the case of the pear crop, there was but little damage from the moth by the first brood, and under more favorable weather conditions and careful inspection and destruction of the larvae, later on the crop was largely exempt from damage in this respect, and was generally in this section the best harvested for years.

In regard to the cost of inspection the past season, as nearly as can be learned about $50 or $60 would cover the total expense of the partial inspection of the light crop in the township. Exact figures cannot be secured, as two of the inspectors were also appointed to look after the destruction of the black-knot and peach yellows, and did part of their work concurrently with that of the codling moth inspection; but the third, whose work was exclusively with the codling moth, and whose division covered slightly over one-third of the township, spent eleven days at $2 per day, making $22, thus making the above estimate about correct. With a thorough enforcement during a season with a full crop, would probably cost as high as $150, which would be a small item indeed providing that the crop can be largely saved by such a course, for the saving would amount to several thousand dollars in the township of Saltfleet alone.

In connection with the work some facts worthy of notice have come to light. In one case where the owners persisted in neglecting to destroy the larvae, after he had bandaged the trees, a species of borer of large size had bored under the bands and succeeded in partially or wholly girdling several trees, and to that extent injuring or killing them. This should prove a warning to such to examine their bands.

Another danger from neglect to attend to the bands is the hindrance to the birds in destroying the larvae. On the other hand, the bands seem to be a favorite and favorable breeding place for spiders, which apparently destroy the larvae through the late fall and early spring cool weather, in many cases 90 per cent. of the larvae being destroyed.

We are informed by the inspectors that where trees were well scraped all the larvae were in the bands, but where not scraped a large percentage were under the bark, and they claim success or failure will largely hinge on this.

ADDRESS OF WELCOME.

Mr. Hayden: We thought it would look fraternal to extend you a welcome to the town at this morning session. We were selfish in asking you to come here, but we realized that the Counties of Northumberland and Durham needed the benefit of such a meeting in our midst. Some of us know of the good work this Association has done for this Province and the Dominion: in fact, where would we be in the apple trade if it were not for the existence of this Association. We all know what Canada has done in the apple market. We know how we swept the boards of fruit at the Pan-American, and we realized that it was very important that we should have you among us. This summer, and in fact the last year or two, Canada has taken her part in the world, and the last summer a far more important part than ever before, and we think that by your coming here we may awaken a deeper interest in our local Horticultural Society.

Major Snelgrove: I know that every indication shows that the Convention that has just been opened will be one of the best in the history of this Association. I may say that although we have heard that the Grimsby district is the garden of Canada, we claim that the United Counties of Northumberland and Durham constitute one of the ingle nooks of that garden of Canada, and the census returns show, I believe, that the County of Northumberland alone contains the largest number of apple trees in Ontario, and I am sure you will all agree with me that the apple is the king of fruits. The oranges of the southern clime are like gourds compared with that king of fruits. I might also mention that in this County we have the largest store houses for packing and shipping of fruits, we have the largest depots where apples are gathered for export in the Dominion of Canada, and therefore it is most suitable that you should meet in the County Town of this County. I need not say that fruit growing is one of the noblest of occupations. This Association, as has been said, is the oldest and largest Horticultural Association in existence, and we are very proud of the fact that Cobourg Horticultural Society has about 100 ladies and gentlemen who are proud to be members of the Ontario Fruit Growers' Association.

The President briefly replied, thanking Messrs. Hayden and Snelgrove for their kind words of welcome.

REPORTS UPON FAIRS AND SOCIETIES.

The Western Fair (London).

J. S. Scarff: The London Fair, which has been established now a great many years, is growing all the time, and now it stands second in the Province. The Fair Grounds are beautifully located, only about fifteen minutes' walk from the Post Office or business part of the city, with cars running there every few minutes for the accommodation of visitors. The buildings are very fine, the main building of course is not as good as they have in Toronto, but the buildings for the stock will not, I think, take second place to any in the Province. The exhibits this year were very large, among the horses perhaps the largest in the history of the Fair; the cattle were also very largely represented. The main building of the Horticultural department and fruit department were well represented. The Horticultural department probably has not been better for many years. The fruit department was not as well filled up as in former years. The exhibit in apples this year was probably not more than one-third of last year's exhibit. There was a very good showing of grapes and pears, not a very good showing of plums, but on the whole a very good exhibit. The system they have of exhibiting their fruit excels, I think, anything I have ever seen, and I think the credit here due is to our friend, Mr. Race, who submitted the idea to the London Association a few years ago. The exhibits are made on tables, just set out through the hall, so that it is convenient to see and inspect the fruit. The old plan of putting them on the shelves, I think, has gone into the past ages. Mr. Race had some little difficulty at first in getting them to take hold of it, but I think the managers now see the wisdom and benefit of that system. The exhibit of fruit and vegetables was very large this year and a good exhibit.

Eastern Fair, Ottawa.

Mr. R. B. Whyte: Like most fairs this year owing to the shortage of crops of fruit our exhibits were much smaller than of old. The quality, however, was good. At Ottawa we have cut off prizes for some of the fruits we cannot possibly grow, and perhaps for that reason, owing to the prize list being cut down, our exhibits were not as full as in some former years. We found by experience that very few of the western men were attracted by the amount we could give in prizes for pears, etc., to exhibit in Ottawa; therefore this year they struck off some of the prizes, but I believe they intend to bring the prize list back to its former standard. Our fair is largely an apple show, as regards the fruit exhibit. We do not grow as large

an assortment as they do here, but as far as quality goes, we have as good as any place in Canada. We think that our fruit tastes better, and it certainly is more highly colored. One advantage our fair has is that we always have a number of very fine exhibits from the Experimental Farm.

The American Pomological Society.

Mr. Race: There is not very much to report of the meeting of the Pomological Society of New York. My visit gave me a good deal of pride in our own Association, for I found that we were just as practical as they were. While I was there the chief discussion was the exhibit of apples at the Fall Fairs. It seems up to this time they had no particular number of apples to a plate, some would have perhaps four, while others would run up to eight and ten. Our Association was referred to in the discussion, and our system of allowing five to the plate was considered and adopted by them.

G. C. Caston (Craighurst): I think we went there with a wrong idea of that meeting. The American Pomological Society is a very extensive concern, reaching over America, at least the United States and Canada, and a large part of the time was occupied in reading reports from different parts of the country all the way from Florida to Minnesota in regard to different fruits and their adaptability to those different localities, and of course the Florida and California fruits were principally citrus fruits that we were not much interested in. There was a very interesting discussion on the subject of bees fertilizing flowers, and an entire evening was given to the bee men, who were pretty well represented. One gentleman took up a great deal of time and said very little, but there was a scientific gentleman who gave some very practical addresses on the importance of insects, especially the honey bee, to fruit growers in fertilizing the blossoms of the fruit. One of the most important papers, to my mind, was the one given by our own Secretary on the export of North American fruits. Mr. Powell, who was with us last year, made an important point in the discussion of that paper, that in the export of fruit the quality is the first consideration. There is no doubt of that, and that we must begin in the orchard to produce that quality by the improved system of cultivation, spraying and paying attention to all the details of fruit culture, being ever and always at it to secure quality there. We knew that the State of New York was a great fruit state, the cultivation of important fruits having been begun there before they were here, and we were proud to know that New York was the only state that was ahead of us at the Pan-American. Well, I think we should give New York a little more credit than we are disposed to do on that account. In going from Niagara Falls to Buffalo I saw a great number of orchards, but I did not see a single apple. In going from Toronto to Niagara Falls there was a great scarcity of course on the Canadian side, just here and there a small sprinkling of apples, but from the Suspension Bridge to Buffalo I do not think I saw an apple, although I went over on the New York Central and returned on the Lehigh Valley. I also noticed that, after all the teaching of Prof. Bailey and other eminent men, a great deal of the soil was still in sod. I do not know whether that had anything to do with the barrenness, but nearly all the orchards, and some very large ones, were standing in tough sod. If that state of things exists largely over in New York State, I think they must have made a very creditable showing, taking all things into consideration. I think it is a mistake to send so many delegates to those meetings to represent our Society; I think two would be sufficient. We had a very pleasant time, and we found the Americans the most agreeable persons we could possibly meet. Some person has said that the Yankee is the most entertaining and pleasing companion you can possibly come across, because he will find out what you know, and he will tell you all he knows, and what you both don't know he will guess at. (Laughter.) However, that may be, we received every attention, and have nothing to complain of: in fact, we received so much kindness and courtesy as to fill us with the desire to go again at some future time.

Alexander McNeill: The Michigan Horticultural Society constituted me a delegate from this Association at two of their meetings, their summer meeting at Detroit and their fall meeting at Munroe, and I wish to put on record the fact that I never was more royally entertained, and have seldom attended more interesting meetings, and I feel like publicly expressing my hearty thanks to the fruit growers of Michigan for the welcome they gave to our Society through me.

The President: I have pleasure in calling on our Fruit Commissioner to the Pan-American, Mr. Bunting.

W. H. Bunting (St. Catharines): I looked forward with a great deal of pleasure to the meeting of the Pomological Society, and regretted very much that my duties prevented me from attending all the sessions. However, I had the pleasure of attending two, and I wish to corroborate what Mr. Race has said with reference to the comparison between our Ontario Society and the American one. While there was gathered there a very large galaxy of the professors from the different States and a large number of experts, yet I felt satisfied afterwards that the rank and file of the members of our Association in their meetings compared very favorably with the rank and file of the members who attended there, and after that meeting was over I had a much higher appreciation of our own Association than I ever had before. I was also extremely pleased to be instrumental in assisting a number of our fruit growers in presenting before the Society the claims of our fruit growing industry in a practical way, and it was with a great deal of pleasure that I heard the announcement of the awards that were made the last evening, where four of our members received recognition that they were justly entitled to. I am sure that this recognition was the more valuable from the fact that the exhibits made by our members were made specially for the American Pomological Society, and were independent of our general exhibit, and did not compete in any way with it. In a number of cases our exhibits before the Society were compelled to compete with the complete exhibits of the various states, which were entered for recognition and consideration by the Pomological Society, so that on that account I think the awards that came to our members were more valuable and of greater importance. At the close of the meeting I had the pleasure of suggesting that at some future time they should arrange to have their biennial meeting held at some suitable point in Ontario, and I felt sure that I voiced the feeling of our Association in suggesting that idea. It was an extreme pleasure to me to meet so many gentlemen of prominence and importance in connection with fruit growing throughout the States, and felt that it was a matter to be regretted that the unforunate circumstances which occurred just at that time prevented the gentlemen attending that meeting from taking cognizance severally as they would, no doubt, have done on the following Saturday, of the General Exhibit that we were at that time displaying for the Province of Ontario.

Quebec Pomological Society.

Mr. Harold Jones (Maitland): I attended the eighth annual meeting of the Quebec Pomological Society, held at Huntingdon, January 31st and February 1, 1901, as representative from this Association, and must say that although the Society is comparatively in its infancy it has done and is doing a wonderful amount of work, and is bringing to our knowledge the resources of the country in the growing of apples and plums that was a surprise to me and many other visitors at the meeting. I was particularly pleased to see the interest taken in the meetings, and the large attendance from the surrounding country. Farmers came to the meeting, anxious to learn, and asked questions and discussed subjects quite freely, which must have been very gratifying to the directors, when they had devoted so much time and thought to making the meeting educational and interesting. I endeavored to have the Society endorse the action of the Ontario Association in the Fruit Marks and Inspection Act, but there was very little interest taken, as there are practically no exporters among the growers, who look to Montreal City and local trade for the consumption of all

surplus fruit. Mr. R. B. Whyte, of Ottawa, explained some of the advantages of local Horticultural Societies affiliated with the Provincial Society, and the subject received favorable attention, and will no doubt be seriously considered by them when they realize the good work they are doing here in Ontario.

The report then went on to give a resume of the addresses delivered by Professors Waugh, Craig, Fletcher and Saunders, and said that the discussions were spirited and profitable. For a young society Mr. Jones considered the Quebec Society to be in a flourishing condition and well managed.

There is one thing that I would wish particularly to call attention to in this report, and that is, as to the reading course that Prof. Craig is conducting, under the control of the New York State Government. It is wonderful what an interest the people are taking in that course; it was first started as an experiment, but now has thousands of readers. It is one of the very best innovations that has ever been taken up for the education of the farmers, and I hope that our Provincial Government will be able to take up something of a similar kind for us in Ontario. It is not every farmer's son that is able to go to an agricultural college. If they get away for a few weeks from their homes, and finish their schooling, and get to a business college, that is about all they can do, but this reading course brings this knowledge right to their doors, and I believe to-day there are thousands in our Province that would take it up if they had the chance. I think that subject might well be discussed amongst us, and a recommendation placed before the notice of our Minister.

Prof. Waugh of Vermont was introduced, and after a little pleasantry about the annexing of Canada, said : One of the speakers has said that a large number of the Wilder medals were given to the Canadians. They belonged to the Canadian as much as anybody else, and everybody felt so. He said that there seemed to be no jealousy at all on the part of the fruit growers there, that a large number of the medals should come here. I am very sure that is true; in fact, I am sure they were delighted that Canadians took so much interest in the meeting, and made such a strong endeavor to be present and to exhibit their fruits, and show what they were doing in this line, and they were very glad indeed that such a recognition should go to them.

Prof. Macoun of the Experimental Farm, Ottawa, expressed his pleasure at being present, and said : We work a farm in a section of the country, which is very seriously handicapped on account of the severe winter, and on this account I am not able to carry on many experiments which are useful to you in more favored parts of the Province, but in coming to you I learn better the conditions, and in that way I can be more helpful to you, and if I can say anything that will help to make the meeting more interesting, or to impart information I shall be very happy to do so.

REPORT OF THE COMMITTEE ON NEW FRUITS.

The following report was presented by Prof. H. L. Hutt, Ontario Agricultural College Guelph :

The object of this Committee on New Fruits is to take note of and report upon the new and seedling varieties of fruits which appear from time to time. The importance of such work may readily be seen from the fact that many of our most valuable varieties of fruits now under cultivation have been of chance origin. We are on the lookout, therefore, for anything new in the way of fruit which promises to be of value.

So far our attention has been confined almost entirely to seedlings of Canadian origin, and the large number of these already in cultivation is a subject worthy of note; but, at the suggestion of the meeting last year, we have made an effort to enlarge our field of work by taking note also of the new and promising varieties which may be brought forward by American growers. A circular explaining the nature of our work and soliciting their co-operation was sent out last September to many of

the prominent American introducers of new varieties in hopes that we might have something from them of interest to report at this meeting. From a few of those interested, particularly in the earlier fruits, we received replies, that it was too late for them to get samples this year, but from the majority we have still to hear. So that what fruits we have to report upon at present are all of Ontario origin.

Owing, no doubt, to this being somewhat of an off year for fruit, particularly for apples, there are fewer fruits to report this year than usual. What is of more importance, however, is that a number of them appear to be quite promising.

The following are those that have come to our notice during the past year :

Seedling Apples

No. 1. A very handsome winter apple received on Christmas Day last year from Mr. Brechon, 456 Dundas street, Toronto. In size and shape it is much like a large-sized Seek-no-further, but the color was that rich red and golden yellow of the King. The quality was excellent, and, if this is really a new variety, it is well worthy of propagation. Mr. Brechon says it was a seedling grown by an old gentleman, now dead, who was always experimenting in that line. We tried to get samples of this apple to show at this meeting, but have not had any reply so far to our letter asking for them.

No. 2. A showy winter apple, very much like Ben Davis, but of better quality. This apple was sent in by E. Leonard & Sons, Cobourg. Mr. Leonard says he has been handling apples for the last thirty years and feels confident that this is an improvement on Ben Davis, being as hardy and productive as that variety and of a better quality.

No. 3. An Algoma seedling, from Mr. John Pink, Millford Haven, St. Joseph's Island. This is rather an inferior apple, said to be a seedling from a Russet, but the smooth, greenish white skin and dull red cheek show little of that parentage. The flesh is as white as that of the Fameuse, but it is quite acid and of poor flavor. The tree is said to be hardy and productive, and the fruit a good keeper. These are qualities which our friends in Algoma are on the lookout for, but we think they will find them in other varieties of more attractive appearance and better quality than this one.

No. 4. A seedling apple, from Mr. T. W. Gibbs, Huntsville, Ont. Fruit roundish, conical, above medium in size: cavity, medium depth and width; stem short, moderately stout; basin narrow, medium depth, slightly wrinkled; calyx closed; color pale greenish yellow, splashed and washed with carmine: dots obscure; flesh white, tender, juicy, core medium; flavor sweet, pleasant; quality, good for a sweet apple; season, October.

No. 5. Seedling apple received from C. A. Cass, L'Original, Ont. Tree said to be very hardy and a vigorous grower; seedling of Fameuse, which it resembles in many particulars; third year of fruiting bore about three bushels of clean fruit. Fruit roundish, above medium size; cavity deep and of medium width; stem medium length, moderately stout; basin medium depth and width, wrinkled; calyx closed; color, pale yellow, almost covered with crimson, but a few patches were only streaked with it: dots moderately numerous, small, distinct, yellow: bloom rather heavy; flesh white tinged with red, crisp, juicy, sub-acid, pleasant, Fameuse-like flavor; quality, good ; season probably early to mid-September: promising.

No. 6. "Rufus Apple," from Miss J. Matheson, Perth, Ont. Originated in the garden of Lieut.-Colonel Matheson, M.P.P., Perth, Ont., about seventy years ago. The tree is hardy and a very strong grower. Fruit roundish, conical; medium size; cavity narrow, medium depth, russetted; stem short, slender; basin narrow, shallow, slightly wrinkled; calyx closed; color pale yellow, well washed with crimson, dots numerous, pale yellow, distinct; flesh white tinged with pink almost to core, tender, juicy, sub-acid, pleasant flavor, skin moderately tough: quality good. Season mid-winter to late winter. Probably a seedling of Fameuse. Promising.

Seedling Pear

On October 23rd last we received from Mr. E. C. Beman, Newcastle, samples of a large showy pear resembling very much in shape and coloring the Sheldon. In reporting upon this pear we cannot do better than quote Mr. Beman's own words with reference to it. He says :

"I am sending you by this mail a box of seedling pears to examine and report upon. The tree has been bearing for three years, is apparently hardy, and is a vigorous grower. The form of the tree is somewhat like the Flemish Beauty, but a little more open. It is quite productive, with the fruit evenly distributed throughout the tree. A longer time will be required to decide upon its merits, but I am inclined to think it will prove a valuable market variety, being very large, handsome, of good quality and entirely free from spotting."

I can heartily endorse all Mr. Beman says of the large size and handsome appearance of this pear, but I thought the texture hardly as fine and the quality not quite so high as we would like to find in a new variety if it was to be added to the list of those now in cultivation, although I see that Mr. Woolverton in The Horticulturist speaks of it as "uncommonly large and the flesh fine and buttery." Mr. Macoun describes its flesh as "yellowish, juicy, sweet, tender melting; core small; quality good." It may have been that those I sampled were hardly in fit condition. In answer to a letter in reference to this point and asking for particulars as to origin, Mr. Beman gives the following additional interesting information :—

"About ten or eleven years ago I planted a quantity of pear seeds taken from windfalls of good varieties, such as Sheldon, Anjou, Flemish Beauty, etc.; in fact, anything I had that was not sound enough to pack. I planted out where other trees had died, probably two hundred or more of the seedings of these, the most of which have commenced to bear, and this is the only promising one of the lot. The quality is not quite as good as I would like, but it is much better than that of many varieties considered first class for market.

"Being a chance seedling, it is, of course, impossible to say just what it is from, but, judging from its appearance, it might be a cross between the Sheldon and Clapp's Favorite. It has the granular flesh, and approaches the shape and time of ripening of the Sheldon, and it has also the abundant and slightly acid juice of the Clapp's Favorite."

This pear is certainly worth watching, and we hope to be able to test its quality more carefully next year.

Seedling Plums

Prof. W. T. Macoun, Central Experimental Farm, Ottawa, writes :—

"We have been growing a large number of seedling American plums here, but have discarded nearly all those which have fruited, as they were no better than the older varieties. Two very promising ones, however, were described in our report on new fruits last year, and this year there is one more, which I have named Caro. It is a seedling of Wolf, roundish ; large to very large ; suture fairly distinct, not depressed; color bright red showing yellow in patches, bloom light, dots numerous, yellow, distinct; skin thick, moderately tender; flesh deep yellow, juicy; stone large, outline oval, considerably flattened, clingstone, flavor sweet, rich, good, quality very good. A very promising seedling, more attractive than Wolf and better in quality. Sampled September 7th, 1901."

No 1, Seedling Peaches

On September 20th we received from Mr. A. E. Sherrington, Walkerton, samples of a fine, large, showy peach of the Crawford type. These averaged 2½ inches in diameter. The flesh was yellow, free from the stone, and of good quality.

The tree is young, just beginning to bear. Mr. Sherrington says it bore this year about half a basketful of fine peaches.

As hardiness is one of the qualities most desirable in the peach, if we are to extend the area over which it is grown in this Province, it is not at all unlikely that we may find just what is wanted in some of these northern-grown seedlings. This variety has certainly good appearance and fine quality, and, if it has any extra hardness, it is well worthy of propagation.

No. 2, The Rainbow Peach

Grown by Mr. D. Sare, London, Ont. A photograph and description of this peach is given in the November number of The Horticulturist, where the following account of its origin and qualities are given by Mr. Sare :—

"My wife and I bought some peaches when at Mackinac Island in August, 1897. My wife put two or three of the stones in her trunk, and, on our return home, I planted them. The following spring they grew, one of them more vigorous than the others. I gave this one particular attention as to pruning, etc., and have been rewarded this spring by seeing my tree well covered with bloom. The tree set about 100 peaches, which were thinned out to about thirty, and I harvested about twenty fine peaches, four of them weighing one pound six ounces and a half, and each measuring in diameter, as near as possible, three and a half inches. The rest of the peaches were all very fine, but not quite as large as these. The fruit is very fleshy, luscious, and has a very small free stone. The color is golden yellow inside, with pink markings. Finer peaches we have never eaten. I called them the Rainbow peaches, because their colors were so magnificent and beautifully blended, from a straw color to a purple."

Seedling Raspberries

Mr. R. B. Whyte, Ottawa, has raised quite a number of seedling red raspberries, one of which, formerly known as No. 17, now named Herbert, is proving to be of extra merit. It is under test at the Ontario Agricultural College, Guelph, also at the Central Experimental Farm, Ottawa, and at the State Experiment Station, Geneva, N.Y. At Guelph it fruited for the first time this year ,and, while not ahead of Shaffer and Columbian, it ranks near the head of the list among about 30 other varieties.

At Geneva, we are told, it headed their list this year for vigor and productiveness, and Prof. Macoun makes the following reference to it in the last number of The Canadian Horticulturist :

"Last winter raspberries suffered very much in this locality, as a result of which the crop this year was small. A seedling known as Herbert, which was originated several years ago by Mr. R. B. Whyte, of Ottawa, proved much hardier than most of the other varieties tested, and there was a good crop of it. It is hoped that this fine variety will soon be offered for sale, as it should prove a most desirable acquisition to the kinds now on the market. It is of the largest size, bright red, moderately firm, of good quality and very productive, and its hardines will make it especially valuable in the colder parts of the country."

In response to a request for particulars as to its origin and behavior at the home of its originator, Mr. Whyte has sent us the following :

"The Herbert is one of about 30 seedlings that I grew about 10 years ago. They all came from a mixed lot of seeds that were thrown into a henhouse in the garden. On removing the henhouse the next spring a large number of raspberry plants grew up. I selected the most promising and planted them for testing. On the first season's test I discarded all that were inferior to the best varieties, and in succeeding years all that were not superior to anything I had grown. I have now got down to three, No. 7, 13 and 17. No 13 is a grand berry in size and quality, but has the defect of growing very long fruiting branches, which are apt to break off with the weight of the fruit. No. 7 is better in all points than Cuthbert and Loudon, but does not bear the crop nor has it the vigor of No. 17. The good points of No. 17, the Herbert, are, first, its great vigor and hardiness. We have no berry that grows such strong, hardy canes; second, its productiveness. My family say it bears more than

twice as much as any other variety; third, its large size. There is no other variety larger, and very few as large. It is much larger, on the average on my ground, than Cuthbert and Loudon; fourth, quality is first rate, juicy and sweet, much nicer for table use than Loudon or Cuthbert."

H. L. Hutt.
W. T. Macoun.
L. Woolverton.

Robert Thompson (St. Catharines): What is the season of that new peach, the Rainbow?

Prof. Hutt: I don't know that Mr. Sayer mentions that. We have his account of it, and the photograph shown in the Horticulturist, but I will try to get the particulars for next year.

A. M. Smith (St. Catharines): What is the season for that one of Mr. Sherrington's?

Prof. Hutt: September 20th. That is a little later than the Crawford in your section.

Mr. Thompson: With regard to that first seedling apple of Mr. Brechon, it is very similar to the old-fashioned English Hubbardson.

Prof. Hutt: Yes, it had somewhat the appearance of the Hubbardson, but it struck me as being a somewhat larger apple and had the color more of the King.

Mr. Thompson: Mr. Brechon sent it over to Buffalo, and it was the Hubbardson he sent there, and the other apple was another old standard apple; there was only one that could not be named out of the three.

G. C. Caston (Craighurst): Do you mean to say that this new raspberry is better than the Cuthbert and more hardy?

Prof. Hutt: It is a new raspberry with the originator, and as Mr. Whyte and Prof. Macoun have propagated it for three or four years, I would like to hear Mr. Whyte on it. He is the father of it.

R. B. Whyte (Ottawa): I don't know that I can say more than I said in that letter I sent to Prof. Hutt. Mr. Macoun has it under different conditions from mine. As far as the hardiness is concerned I cannot tell, because I cover everything. I lay raspberries down. This past winter I have discarded Cuthberts altogether. I consider this new one very much hardier than the Golden Queen. Mr. Taylor told me at Geneva that for vigor and for crop it stood at the head of the list of all the varieties they had there, they have had it now for five or six years. I have it and the Loudon growing alongside in exactly the same state and condition, and it grows three times the bulk of wood the Loudon does, and bears three times the fruit. Our girls who do the picking say they do not want any other raspberry to pick, so I have discarded all raspberries except my own three seedlings of the Saba, and I have grown practically every raspberry that has been grown in this country Where space is valuable, as it is with me, it had the advantage over all others on account of the large crop.

Prof. Macoun: We have had this raspberry, No. 17, fruited for the last two years. Last year it yielded very well, and this year we liked it and Mr. Whyte's No. 7 better than any other varieties we had, and the only other varieties that yielded better were some of our own that were not as good in quality or size. This berry is a much better retail berry than a Cuthbert, though I don't know that it will ship better. The great advantage with us is that it is so much hardier than the other kinds. Last winter, alhough we bent down all our canes, as we always do, they were winter-killed, or almost so, while this hybrid came out all right.

Mr. Caston: Do they winter-kill after you bend them down?

Mr. Macoun: Yes.

Mr. Caston: There is one thing we want very badly, that is a raspberry of a better quality and a better bearer than the Cuthbert, and one that will stand in the northern sections without winter-killing, without losing so much bearing wood.

Mr. Boulter: Do you cut them back through the summer?

Mr. Caston: Yes, but in the open valley they will continue to grow till the snow comes.

Mr. Sherrington (Walkerton): I think that is the great fault with the Cuthbert. It grows too late, and the vines are too tender when the winter sets in.

W. A. Whitney (Iroquois): I think the most desirable fruit we can think of to-day is this raspberry, but it is tantalizing to us when we find we cannot get it. It is only in the hands of the colleges and Mr. Whyte. I would like to have it.

The President: Is anything being done in the way of propagating it for distribution?

Mr. Whyte: Well, I have quite a large number of plants. Several people have been negotiating with me. I am not in the business. I could distribute it in small quantities.

Mr. Sherrington: I should very much like to have a sample of it in my plot. I have some seventy varieties, and I would like to test it with the rest.

Mr. Whyte: I would have no objection.

The President: I should think some of our nursery men should take hold of this berry.

Mr. Caston: It would be well to have it tested first at the various experiment stations; if it is all that is claimed for it, it will be a valuable acquisition.

Mr. Boulter: That is what the experiment stations are for. We have things experimented on at Guelph, and we never see or hear of them, except at these meetings.

Prof. Hutt: Whenever we receive a new variety like that we are under obligation to keep it in restriction. It would not do to break faith with the originator by distributing it.

SAN JOSE SCALE.

By Geo. E. Fisher, San Jose Inspector, Freeman.

At the last meeting of this Association at Brantford I think we talked considerably about the life history and habits of the scale. On this account I think you will probably prefer to hear something of the development of the scale in the Province, and the condition at the present time, and what is being done to control it, and the results. It affords me indeed very much pleasure to say to you that the scale has developed at very few new points—(Hear, hear)—in a surprisingly few; and I think this reflects much credit upon our early work. This is encouraging, especially as there is a feeling of alarm going through the country, and the people seem to be anxious about the scale, and we think that if it were turning up at new points we would hear from them, and there would be samples sent in. There are samples of other scales sent in, and I am disappointed to find that the people throughout the country are so ignorant of the appearance of the San Jose Scale upon the wood. If we could devise some means for distributing the information of this, it would be very useful indeed. as it would enable people to detect the scale more quickly upon its coming among them. The samples that are sent in are mostly red plum scale, oyster shell bark louse, scurfy bark louse (Aspidiotus Ostraformis), and a few similar scales, samples of which I have here, as well as samples of the genuine article. They are not alive at this time of year; there is no movement now.

The Secretary: Would they not come alive in this warm room?

Mr. Fisher: I think not, they have been pretty well frozen, and I cut them last night by the light of the moon. (Laughter.) Now, while this seems to be the condition of the country generally, I must say to you that in the old centres of infestation. where the scale was first found, the multiplication and distribution and the destructiveness of the scale is greater than ever before; in fact, in those places it is really alarming. In order to enable you to understand something of the situation I

might say that in several orchards that have been closely observed by me all the way along, in which we found very little scale in 1899, in fact, it was difficult to find—in 1900 the scale could be found on any tree, and almost any twig. In most cases the orchard bore full crops of good fruit in 1900. There were peaches on some of these orchards this year, and I took them off and ate them myself from trees that are dead now from the attack. The scale has sucked them out since the crop was taken off. There are trees of all kinds that have been killed by the scale; not only peach trees, but plum trees and pear trees, and even apple trees. It was originally supposed that the apple trees, being more resistive, would be sufficiently so not to be injured by the scale, but this we find to have been a mistake. The apple orchards, if seriously attacked, will succumb. There are many instances of this. There is no longer a lack of evidence of the destructiveness of the scale, and those wishing to get information on this matter can satisfy themselves by visiting an infested section, for the scale at those points has asserted itself, and has demonstrated by actual work the worst that has ever been said of it. Now with this evidence before their eyes, the people of these sections have materially changed their feelings in regard to the scale. Some of them, even now, fail to recognize it as a dangerous enemy, but the majority of those whose interests are large, feel that the scale is among them, and that it is here to stay, and that they have to do something, and that they must do it at once, and they are anxiously inquiring what to do.

I had the pleasure of a visit from Prof. Webster, State Entomologist of Ohio, who came last summer to spend a week with me at my home in Burlington, and during that week we visited a number of points, and it was a great satisfaction to me when he told me that we were making more progress in our investigations here than he knew of elsewhere. (Hear, hear.) We have been trying a number of experiments, some of which are very promising indeed, and at his request, and with the permission of the Minister, I went with him over his work in Ohio, beginning on the south shore of Lake Erie at Mentor, a short distance east of Cleveland. We visited four points, one at Mentor, one at Lakeside, again at Catawba Island, and then a few miles north of Toledo; and the impression gained from these visits are that the scale in Ohio is identical with the scale here, and that is my conclusion from visits farther south at New Jersey, Delaware, Maryland and Virginia. I have found San Jose Scale wherever it was to be found, and the behavior of the scale under treatment, and that of the trees, is much the same there as here. The lessons learned were principally corroborative, and useful in proving my previous conclusions; but they have been operating against the scale there longer than we have; they recognize the necessity, for they say the scale has been among them a little longer, perhaps, and the people are more alive to the necessity for this. They have seen orchards go down before their eyes, and they realize that unless they prosecute a fight vigorously fruit growing with them is a thing of the past, as it certainly is here where the scale has taken possession of a section. The people must either fight the scale or give up the business.

In the spring of 1901 there was a considerably larger quantity of spraying material distributed than in 1900. The Minister of Agriculture has very kindly assisted the people in this matter by furnishing whale oil, soap and crude petroleum at one-half what it costs, to whoever would apply for it, to use against the San Jose Scale. There is a difficulty in getting this soap and oil; those who have undertaken to get the oil themselves have not been successful, because the oil people did not care to be bothered with small orders, but it was furnished in considerable quantity, and we succeeded in getting what I believe to be the best oil that this country affords, that is, the lighest oil. The gravity of the oil used was 39½, and on account of a lighter oil being recognized by some in the United States it was thought desirable to use a quantity of Pennsylvania oil, which upon its arrival was tested and found to have a gravity of 44½, which is five points lighter. The people used this material on their trees with greatly varying results, which results seemed to be in keeping with the way in which the material was used. A large quantity of ma-

terial is not necessary, but every part of the tree must be reached, and where thoroughness and care were exercised in applying the remedies the results are very encouraging indeed.

We conducted quite a variety of experiments during the year. We used the Ohio oil and the Ontario oil, both diluted and undiluted. We used three samples of whale oil soap. We used a combination of soap and oil, we also used the celebrated California wash of lime, salt and sulphur, and at the request of Mr. J. H. Fairbank, of Petrolea, who supplied the material, we treated a row of trees with the water that is pumped up with the oil. The water is mineral, and Mr. Fairbank reasoned that it might be effective in destroying the scale and he was so much interested in the matter that he put up a couple of barrels and sent them out at his own expense. Besides that, we poisoned some trees at the request of a gentleman in Waterford, and we also imported parasites from Maryland, and fumigated the trees, that is the list of our spraying experiments.

Now as to the results derived from these experiments. The American oil and the Canadian oil applied undiluted, killed all the trees that were treated with it. There seems to be a difficulty in treating a tree with a sufficiently small quantity of undiluted or crude petroleum to cover the tree and use little enough oil not to injure it. We have discussed it very frequently among ourselves, and our conclusion was that not more than a quart of oil should be used on a tree of the size of an ordinary full-grown peach tree. When I speak of a tree, that is the size I mean, that is our standard. The understanding was that not more than a quart of oil should be used to a tree, but the men claimed that they could not cover the tree with a quart of oil with the ordinary nozzle, and they used two quarts undiluted. We found that the ordinary nozzle was too coarse for using such spraying material, but since then we have had made nozzles having very much smaller openings. The nozzle furnished by the pump people, the coarse one, is 14 to the inch, and the next 20 to the inch, and I have had nozzles made down to 66 to the inch, the nozzle having an opening 1-66 of an inch. That seems a very small opening, but with a good pump it will work; there will be no clogging, and you can have a nozzle with an opening anywhere down to that size, and it is not possible to put out a barrel of material in a day with a nozzle of that size. So you recognize how slowly it gets away from you. With the larger sized openings the material gets away from you so rapidly that you get too much on the tree before you know it. There was a row treated with American oil, 20 per cent with 80 per cent. of water, and another row treated with Canadian oil in the same proportion. We found that the scale was destroyed at first a little better on the trees treated with Canadian oil than on those treated with American oil, and also that the trees treated with Canadian oil had a covering remaining throughout the season, while the trees treated with American oil lost their covering, the oil evaporated, and did not furnish this protection any longer than perhaps half of the season. The American oil being lighter is less likely to injure the trees, but it did not destroy the scale as well. The Canadian oil will destroy the scale, and it is somewhat more injurious to the trees than the American oil.

We found that the effect of the soap was to reduce the severity of the oil treatment. A pound of soup and a gallon of water used with 25 per cent. of oil will not injure a peach tree, neither will it destroy the scale as well as 15 per cent. of oil with the soap. We found that it is necessary to work out a formula. We must find what quantity of soap is necessary to correct the severity of the oil treatment, just enough to kill the scale without injuring the tree. We have some splendid illustrations of the usefulness of this mixture. I know of several instances where oil and soap have been combined and the scale has been destroyed, and the peach trees are not injured in the least. With regard to the soap, I like it very much. It is a splendid remedy, providing the soap is good and enough of it is used. It is expensive, and the tendency is to use too little in the mixture, and to use too little mixture on the trees, but if the soap were not so expensive I would like it better than anything else on peach trees. On encrusted trees there seems to be a difficulty in getting at

the live scale through so much cover, and in order to reach it we have found that a second spraying is very desirable in effect. We treat the trees thoroughly and let the soap soak until the outside begins to dry a little, and then make the second application. The first application is a preparation for the second, and the scale beneath the cover is reached and destroyed by this second application. That is unnecessary except in cases of encrustation.

The lime, salt and sulphur mixture has been spoken of by a great many, but it has been said by those who were supposed to know that it would not serve a good purpose in this climate on account of the great rainfall. In California they use it, and almost nothing else. They have abandoned fumigation in some portions of California for lime, salt and sulphur, and they feel comfortable in regard to the scale, having the results that they get from the lime, salt and sulphur. I may say that I have not visited the infested districts in California, but I understand that this is not universal. California is 800 miles long, and they are using lime, salt and sulphur in certain parts, and in other parts they are fumigating. The parasite does not work in California. Last spring we got some lime and salt and sulphur and boiled it and put it on a row of 15 full-grown peach trees. You remember how it rained in May ? We got that mixture on just before the rain began, and perhaps the wettest May followed that the present generation has ever known, but the mixture remained on the trees surprisingly. I thought that the drenching rains would certainly wash it off, but they did not, and the effect on the trees seemed simply magical in cleaning them up. I think that not too much has been claimed for soap. It cleans up the trees and invigorates them and improves the orchard very much indeed, but lime, salt and sulphur is as far ahead of soap in this particular as soap is ahead of other treatment.

Mr. Boulter : What proportion of those do you use?

Mr. Fisher : The proportion I would use would be 33 lbs. of lime, 15 lbs. of salt and 15 lbs. of sulphur, with water enough added to make 30 gallons of mixture. This must be boiled for two or three hours. Boil it that long, and boil it hard, and put it on hot. Now I do not wish to be understood as speaking positively about this treatment.. We know very little about it, but the little that we do know is so enouraging that I would like as many to try it as will. In fact I would like the people to assist us in making experiments, and I found that where they do we get some splendid information from the people. Put it on with a spray pump.

W. H. Bunting (St. Catharines) : In three hours you would boil away a large quantity of water.

Mr. Fisher : Don't do your measuring till you get through boiling for that matter; add the water at the close. Now the poisoning we did was without any result at all. The poison dissolved, but it did not seem to affect the tree, and the scale developed and occupied the tree just as much as if nothing had been done. Mineral water was thoroughly applied, but it did not do a bit of good. The scale looks to me to be just a little bit plumper and fresher on these trees than any others. It certainly did not affect it any—not disastrously. The parasites I brought in from Maryland have, so far as I know, not developed, but I want to make some further examinations before I say that they have not. I did find one scale in which there were five black lines that I did not understand. I would like to look into that matter a little more closely before I say anything more about it. The male insect is about the size of the male scale, but it has two wings, and down in Carolina they claim that it is useful. I had a bundle of twigs that were sent over here, that we tied in scale-infested trees, and I hoped that the parasite would develop in the wad that was brought over and get over to the scale in the trees ; I do not know of a better way to accomplish this than the way that was undertaken. In some instances I put potatoes on each end of the wad that I tied to the trees, hoping to keep it fresh a little longer, but they tell me that was scarcely necessary.

Mr. Caston : Do they burrow into the scales and destroy the young insects there ?

Mr. Fisher : Well, we hoped for that, that the insects would devour the scale. We made other experiments, that is, with hydrocyanic acid gas. We got a tent and used the gas on a good many trees. Over 300 trees were fumigated with splendid results. We cannot find a live scale on those trees, which is very gratifying indeed. It costs a little more, but the results are so entirely satisfactory that the cost does not seem to cut much of a figure. The cost of these various remedies is as follows : Whale-oil soap, about 12c per tree; crude petroleum, 2c per tree; combination of soap and whale-oil, from 3c to 5c per tree, according to proportions you use; lime, salt and suplhur, 2c per tree; fumigation, from 16c to 18c for chemicals per tree.

The tent appeared to be not very durable, and the equipment is certainly expensive. The time occupied in treating an orchard by fumigation with a sufficient equipment would not exceed what would be required to give it a thorough spraying. I think three or four men would fumigate probably 200 trees a day, and I would expect, if the work were carefully done, that the scale would be all killed, from such results as we have obtained, but authorities in California say that they have not succeeded in doing this. We cannot find scale on the trees that we fumigated. I treated fifteen trees at Niagara, and we ran out of chemicals. I went down to the druggist at Niagara, and he said he had some cyanide and sulphuric acid, but it had been in the store so long that he could not say anything about it, and was afraid it would not be very good. He had just enough for one tree, and I used it. The tree that was treated with those chemicals was the only tree on which we could find live scale at the present time, and this goes to show the necessity of having chemicals right. On the other fourteen trees we have not been able to find any scale remaining alive; and I have sent samples of branches from these trees to different points in the United States, and some were sent to Prof. Fletcher at Ottawa, and also samples taken to the meeting of the Entomological Society at London, and in no case has a live scale been found on these branches.

Mr. Race : Why should the tents be so expensive ? What are they made of, and how long do they last ?

Mr. Fisher : We do not know very much about the lasting quality of them. The tent that I had is made on a frame, called a box tent, and it has a hood. The frame is 5x5 by seven feet high, and then on top of this there is a hood. The base of the hood is the size of the tent, 5x5, and it goes up six feet above the frame, and then there is a square patch a foot and a half in the top, so that we can fumigate a tree thirteen feet high, and for a tree the form of a pear tree, we can take a rope and rope in the limbs a little, and thus get a pretty good-sized tree into that tent. The hood is the size of the tent at the bottom, 5 x 5.

Mr. Race : Why should not the tent be durable ?

Mr. Fisher : Simply because we find it is not durable. We find the tent that was made in the summer is failing, it seems to be giving out, it tears easily. It is made of ten-ounce stuff, first class, good material, and painted with lamp black and linseed oil, which is recommended by those who have done this work, and I don't know anything else that would rot it except the gas. Mr. Randall, of Niagara, thinks it will destroy the tent, but I think we made a mistake in putting the mixture on the outside, instead of the inside, and we will try it again and paint it on the inside.

Mr. Tweddle : Do not these tents burn as you roll them up and put them away ?

Mr. Fisher : This tent, being on a frame, does not allow of being rolled up and put away, and that is one inconvenience—they require a great deal of storage, but the results are no doubt good. However, 5 x 5 would not be sufficient for a full-grown tree. The chemicals for a full-grown peach tree would be 16c or 18c, whereas the cost of chemicals for this tent that we used was only 5c. You will understand from that how much larger the tent will require to be for a peach tree.

Mr. Thompson : Do you think it would be practicable to treat an orchard that was six or seven years old ?

Mr. Fisher : I think it would be entirely practicable in every respect, if the tents would last; that is the only question at issue with me. If we can depend on our tents we can destroy scale in that way, chemically, because you destroy them so completely. It is a great consideration to destroy that last scale, the one that remains to reinfest the tree, and where fumigation is properly done the margin left is so very narrow that I am satisfied that the trees would not be reoccupied for a number of years, at least for two or three. In regard to the use of crude petroleum, we find it more destructive to insect life than any other remedy that has yet been used ; and for this reason, and it being cheap, it may be recommended for the destruction of the San Jose Scale on all trees that will withstand it. Apples, pears and plums appear to be able to resist crude petroleum when it is used with care, and the Japan plums and the egg varieties appear to be the only ones that require to be treated with especial care. Another advantage of crude petroleum over other remedies is that it remains upon the bark of the trees and protects them from reattack during that season. The Canadian oil, or heavier oil, is considered to be more generally useful than the lighter American oil, and there would be no risk in using that on apples, pears and plums. The difficulty has been with the peaches, and that seems to be the difficulty now. The margin between what the tree will withstand and what is necessary to destroy the scale is very much narrower in peaches than in any other fruits, consequently greater care must be exercised in treating peaches. For apples, pears and plums, I recommend the use of crude petroleum to keep it in check, and for the destruction of the San Jose Scale. For peaches I recommend whale-oil soap. Now whale-oil soap, unless it is used of full strength, and used liberally, will not destroy enough scale on badly infested trees to make even a satisfactory job. It must be good soap, and it must be mixed at full strength of 2½ pounds to an imperial gallon of water, and it must be applied liberally so that every part of the tree is saturated in order to be effective, and when a tree is encrusted, I think it desirable to first treat the tree and let it stand until it becomes a little dry on the outside, and then give it another treatment, and you are pretty sure to have a satisfactory result. The soap seems to be a little too expensive to suit most people; that is the only objection to it. If the soap were furnished to me at a price that would make it as cheap to use as crude petroleum, I would like to use it very much, but it costs nearly six times as much as crude petroleum. It remains to be learned whether lime, salt and sulphur will be as useful as the other remedies for destroying the scale. If it should be, then it is to be recommended for use on peach trees, not only because of its insecticide effect, but because it is an active fungicide. We recommend crude petroleum for apples, pears and plums, and whale oil soap for peaches, until such time as we know more about it. You are quite safe in using these remedies, and they can be used to advantage and profitably used. We propose carrying on some experimental work during the winter. I feel that we are scarcely through with crude petroleum, although we feel pretty well satisfied as to the effect of it. It is recommended to be used in April, and its use then seems to occupy time that people would prefer to devote to other work, and our aim during the winter will be to determine whether or not crude petroleum may be used at an earlier date. And the same in regard to lime, salt and sulphur, and also in regard to fumigation. Our results from fumigation were very satisfactory indeed, but the work was all performed while the scale was active. As I understand it, the destruction is akin to strangulation, and it does not seem to me that the effect will be nearly so good if the fumigation is done while the scale is dormant.

A. M. Smith : Is there any danger of injuring the foliage by fumigating while the scale is active ?

Mr. Fisher : The scale is active, we will say, from any time in March, or the beginning of April, on till the opening of the bud, and there would be no foliage at that time. We did some fumigating in the fall of the year, when the trees still had foliage, and it was done in the night and with a slightly less proportion of cyanide. For trees that were without foliage we used a quarter of a gramme to the cubic foot, and for trees that had foliage we used a fifth of a gramme of the cyanide. We made that difference between trees that were with and without foliage. We did no injury to the

foliage with the fifth of the gramme of cyanide to the cubic foot enclosed. We intend also to determine the quantity of soap to be used in combination with oil, so as to make that useful on peach trees. I would like as many of you as will to assist me in this work, or in other experiments that may be suggested to your mind. There is no reason why the fruit grower should not work out a remedy for this scale, or a remedy that will be generally useful, just as well as anybody else, and if he has the appliances—a pump and a good head—he can go on and bring this into a practicable condition and report to me or somebody else, and let the country have the benefit. (Applause.)

Mr. Boulter : How far east have you found the scale ?

Mr. Fisher : Well, at a good many points in the neighborhood of Belleville.

Mr. Boulter : You never found any in Manitoba ?

Mr. Fisher : Yes, in different parts.

Mr. Boulter : Are you perfectly satisfied in your own mind that you have about the right remedy to stop it, with persistent work, without cutting the trees down ?

Mr. Fisher : I think perhaps I should have spoken to that question a little more plainly. I do not wish to leave any wrong impression with this audience. I think that it is quite impossible to eradicate the scale in any case. That will never be done. You will reduce the scale to a narrow margin, and you will hold it in check, so that you can keep your trees just as long as you fight the scale, but if you neglect it for a year or two the conditions will become as bad as ever; therefore it will not do to neglect it at all. The treating should be done regularly from year to year, and what fumigation will do, I really don't know. That is more hopeful than anything else. The only reliable way for annihilating the scale is by fire, and where distribution has not taken place, I would certainly recommend that any scale found should be promptly destroyed by burning. No one can afford to trifle with the scale. If they have had it in their control, as they would have in newly planted trees, there should be no hesitation in burning it under those conditions. Burn the whole tree, and, more, burn anything that is exposed to infestation. Get rid of it by burning; do not hesitate at all. The scale is worse than I can tell you of. It has demonstrated this year the very worst that has ever been said of it.

Mr. Boulter : They say experience is a good school, but the tuition is a little high. We all recollect what ideas went out from this Fruit Growers' Association, and how the Government took action in burning and destroying and digging out a lot of trees, but they are not doing it now. I was about three or four weeks in California, right at Monterey, the San Jose county, where the scale is supposed to have originated. I was talking to a very intelligent Englishman who had lived here for thirty years, a member of the California Fruit Growers' Association, and I sent our Secretary the report given by him to me, and I talked pretty seriously over this scale business. I said to him, "Mr. Burwick, you are right here, infested with it, as you say. Do you consider it necessary to dig these trees up and destroy them, to keep growing peaches?" He replied, "Why, we don't think of digging up trees and burning them." He took me out to his large peach orchard. "Of course you can see trees there that are infested with it." I asked him, "Are you losing anything by it in the quantity of peaches you grow?" He replied, "No." I asked, "Is the general consensus of opinion that you ought to destroy those trees to get rid of it?" He replied, "No." They fight with it, as you say, by the application of the remedies you suggest, and varnish, if I recollect right. I saw lots of trees there, and there was another insect, larger than the San Jose Scale was, and consequently had a little smaller name, which I cannot recollect. However, my opinion was this, that the Government now, no doubt, is doing about right in trying to stop the spread of this by the processes that we are engaged in, but it did look pretty radical to go to work and destroy the trees ; and when you say, burn them, I do not believe in that. I candidly stand up here and tell you to your face, I don't believe it is necessary to burn the trees to get rid of the scale. I believe science to-day can get over the difficulty, after what I saw in California, to get rid of that scale. It looks pretty serious, after a man has put out an orchard, after a great deal of difficulty and trouble, and after waiting years, to go to work and destroy all his trees. I have

been very much interested in Mr. Fisher's address, and I believe he is a pretty thorough man, a man who can successfully ship his stuff over to Britain without Government help, and make more money than those fellows that are shipping with Government help. I believe he will succeed, and I believe he will do good, but I don't believe in fighting with fire and burning up the trees.

R. G. Way : Is it the same kind of a scale in California as we have here ?

Mr. Boulter : It is a black scale.

Mr. Fisher : The black scale infests the oranges and lemons; but the San Jose Scale infests their prunes and apricots. In regard to Mr. Boulter's remarks I would like to say a word. In the beginning it was intimated that there was not much scale in this country, and, assuming that, the Government set out to destroy it by burning it. As the work went on, we found it more and more, and we found it impracticable to destroy it in that way ; but, considering the nature of the insect, and how very, very difficult it is to handle, if it could have been destroyed by burning, as was undertaken in the beginning, it would have been worth a very great sacrifice to do it. I would urge upon the people, if they find isolated cases of infestation, and it is at all practicable, to burn out the scale, to do it without any hesitation. (Hear, hear, and a voice, "That is right.") If the scale is widely distributed, then you will have to resort to some other way.

Mr. Boulter : Would it not be better to send for you to go and examine it and see if it was the scale ?

Mr. Fisher : Well, I would do it if it were my own orchard.

Mr. McNeill (Walkerville) : How far north does the scale exist.

Mr. Fisher : Guelph and Belleville are the points farthest north where we have found it, but I am well acquainted with a professor in the United States who says that he found the scale wintering successfully in St. Paul. Well, I have been at St. Paul when the mercury was 40 degrees below zero, and I fancy that it stands at that a good part of the winter, and if the scale can winter successfully there, at St. Paul, it will winter successfully anywhere where fruit trees will grow, and that is the opinion which Prof. Webster expressed to me recently.

Mr. Boulter : I suppose the experiments will be continued on, this summer.

Mr. Fisher : They will, this winter.

RESOLUTION RE SAN JOSE SCALE.

Moved by M. Pettit, Winona, seconded by Thos. Beall, Lindsay, and resolved, that, in view of the fact that the San Jose Scale Act is not being enforced; and that in many fruit growing sections where the interests are large, and very little of any of the scale exists, it is desirable that the growers have Government assistance to protect themselves against this pest; be it therefore resolved that the San Jose Scale Committee be authorized to urge upon the Government the importance of enacting permissive legislation on the lines of the following memo :

1. It shall be a punishable offence for anyone to neglect to eradicate the San Jose Scale at once when it is located either by the owner and inspector or anyone else, and brought to his attention :

(a) By burning the infested tree.

(b) By fumigation with hydrocyanic gas.

(c) By thoroughly spraying with crude petroleum.

(b) Or other means approved of by the Department or its officers from time to time.

2. Any township must, on the petition of fifteen ratepayers, appoint an Inspector or Inspectors, whose duties shall be to thoroughly inspect all fruit trees, etc., subject to San Jose Scale in the township, and see that the scale is eradicated where discovered.

3. The Inspector shall be paid one-third by the township and the balance by the Province.

4. Said Inspector shall be liable to fine for neglect.

5. The Provincial Inspector shall supervise the township Inspectors, direct them, and see that they are doing their work in the most effective and economical manner, that they make thorough inspections and that they secure the carrying out of the law.

6. The Government shall supply suitable material for spraying, on the same terms as in 1901.

Mr. Pettit, in moving the resolution, said : In allowing permissive legislation like this to be enacted, it is simply in accordance wtih the "Black Knot," "Yellows," and "Codling Moth" Act, and could be enforced very much on the same lines. It is a very great hardship in some parts of this country where there is so much invested in fruit-growing industry to think that one man, who would have perhaps the same opinion as my friend, Boulter, that the trees should not be destroyed or burnt, should cause his neighbors to suffer year after year, and be obliged to spray and destroy the trees, and be put to all this expense and inconvenience simply because one man will not comply with what, in all reason, would be justice ; and it is no great hardship, if a municipality adopts it, for that municipality to carry it out. Municipal officers are responsible to their electors once a year, and there would be no great hardship inflicted on any person.

Mr. Boulter : I do not wish to say that a tree should not be burned. I wish to say that this Association, established a great many years ago, and managed a long while before I came into it, by broad, scientific minds, doing something for the fruit growers of this country, should find some suitable remedy to eradicate this scale without destroying a man's property. Your ideas are right in that motion, that if a man is obstinate and will not listen to reason and have the remedy applied, then of course he should not have that tree left there.

M. Pettit : The best scientific men in the United States have been working on this problem for several years, and they are arriving at the same conclusions that Mr. Fisher has given you here to-day that it cannot be eradicated by spraying, as it is almost impossible to do it thoroughly enough to eradicate it.

Mr. Boulter : That is what your motion is for, that is to get Government intervention and supplement it with Township Councils, and so on, and, as you say, with fifteen men to put the machinery in force. My idea is, that we should persistently keep on experimenting. Mr. Fisher has told us of half a dozen different lotions by which he thinks the work can be successfully performed and save the tree. You know that the doctors of the Old School, when a fellow's finger got sore, sometimes cut the whole arm right off. They don't do it now. My theory is, that prevention is better than to cut and destroy it, if we can eradicate it by some of the up-to-date ideas that we have at present. I believe that the Government is doing a good thing, and that motion of yours tends in that way, that they should endeavor to continue to eradicate it by such remedies as Mr. Fisher has explained. I had not heard that the scale was found as far east as Belleville. This morning I asked Mr. Dempsey, who has charge of the experimenting station at Trenton, if he had heard of it or seen it, and he said no.

E. D. Smith, M.P. (Winona) : Mr. Pettit's resolution was a pretty long one, and I don't think Mr. Boulter was able to follow the meaning of it all through, else he would have noticed that, if the law is enacted, it means that everyone must keep his own premises clean of the scale. He may do it by any means he likes; he may fumigate, or he may spray, or take any other means to stamp it out, but if he does not get rid of it, and leaves it there as a pest to be distributed among his neighbors, involving the loss of thousands of dollars to them, he may be compelled to do so. Our attention was drawn to this very strongly because two of our neighbors went down into the district that is infested by the scale, and brought back such a report of its frightful progress. One gentleman told of an orchard that he had investigated two years ago, where, after some thirty or forty days' inspection by competent inspectors, only eighty-seven infested trees were found, and they only with a very little scale on, and they were taken out and burned, and the orchard was supposed to be absolutely clean of the scale two years ago. He went down this fall and found 1,600 peach trees in full bearing, but he said he would

not give $25 for the whole orchard. He said they were dead, or as good as dead. That alarmed us, and ought to alarm the whole country, so that some action should be taken. It seems monstrous that one man should be allowed to spread a pest like this all over his neighbor's orchard. We have laws on our statute books with regard to the Yellows and the Black Knot, and they have been enforced by some Townships, and the Black Knot and the Yellows have been cleaned out. Now this is ten times more dangerous than those were, and it seems to us that some action should be taken, and we ask that the Government supplement the grant from the Township, because the inspection of the San Jose Scale would be much more expensive than for the Black Knot, and the Yellows, and we thought that the Township Council might be loth to expend a sufficient sum to thoroughly inspect a Township like this, where fruit-growing is carried on in a large way. I sincerely trust that the support coming from this Association will be given to the Minister. We have always found the Hon. Minister of Agriculture to be very anxious to assist the fruit-growing industry in this matter, as well as in others; but he needs backing; he needs his arm to be strengthened by just such an Association as this. A resolution coming from the Fruit-Growers' Association will give him that backing that he would like, I am sure.

Mr. Pettit's resolution was then put and carried.

REPORT OF COMMITTEE ON FRUIT BASKETS.

By E. D. Smith, M.P., Winona.

You will remember that a year ago, at the annual meeting, I had the honor to move that a committee be appointed to arrange for standard sizes for fruit baskets, and pointed out that up to that time we were laboring under the great disadvantage that we had no standard fruit baskets. We have standard for almost everything else—for a bundle of hay, even—and for the measurement of almost every commodity, but we have no standards for the measurement of fruits, and consequently we have all kinds of baskets. The basket that was supposed to contain twelve quarts, and was a convenient size for peaches and plums, had gradually dwindled down to ten quarts, and anyone could see the injustice of that to the man that stuck to the old twelve quart, or to the consumer who bought the ten quart, thinking it was twelve quarts he was getting. Similarly, the grape basket held ten pounds of grapes originally, and it was sold by weight, and nobody proposed a smaller one, but finally it became more convenient to sell by the basket than by the pound, and they were called grape baskets. Subsequently some one built a basket that would hold nine pounds, and it gradually got down as low as eight and eight-and-a-half-pounds. So with strawberry baskets, although with strawberry baskets there was no great innovation. They were made by the thousand annually, and out of six baskets there would be four or five different patterns being made, and that would have gone on and gradually got as bad as the peaches. The committee appointed by this Association met at Grimsby, and adopted six different sizes of baskets, two for strawberries, and four for other fruits. The strawberry box was to contain 4-5 of an Imperial quart, that is, equal to the Winchester quart, and practically the size of box used by all the factories in Canada, except where some few cases have been made and called "sharks," a little smaller than the ordinary. The object of the Act was to stop that. In all cases the sizes were adapted as nearly as possible to those that were most commonly in use.

Mr. Boulter: About what weight of strawberries would that box hold?

Mr. Smith: I could not say; it holds four-fifths of an Imperial quart. Then a half of that, two-fifths of a quart is the pint box. That is a basket that is not used in Canada much, but it is used in the United States a good deal, and we thought somebody would want to use it. Then for the other fruits there would be four baskets. The one holding fifteen quarts or more would be a basket for wine grapes, and it was made fifteen

quarts or more, so as to not interfere any more than necessary with market baskets, or with people who want to bring in peaches from the United States in bushels, such as canning factories. Then, below that is the eleven-quart size, and 5¾ inches deep, perpendicular inside measurement, as nearly exact as possible. Now our old basket that was originally twelve quarts got down so that, after getting samples from a number of factories, I found four different sizes that were called twelve quarts, and the largest of them held 11½, so that your Committee, after a good deal of discussion, determined on a basket that would hold exactly eleven quarts, this being nearly as large as the largest basket that is in the country to-day, and that depth was fixed on because it fits three layers of ordinary peaches—not selected or choice, or extra peaches, but what will ordinarily go in commerce as first-class, that is to say, the better half of the crop, as a rule. Some size and some depth had to be adopted that would fit best for peaches, and after trying different depths, and getting the experience of different men for packing, this size was agreed upon. The next size gave us more difficulty. We had the grape basket, which was supposed to hold ten pounds; we had the six-quart basket; we had the ten-quart basket that holds nine pounds, and there were some between these. Some were used for peaches, some for plums, and some for grapes. We thought if we could strike a small basket that would answer all these purposes it would simplify matters wonderfully. The reason for simplifying was that, if we could reduce the number of sizes, they would pack more easily in a car. There is a great deal of business done in that way now, and will be more in the future. If a shipper goes to pack a number of baskets that are different sizes, he will find a great deal of difficulty. We could not get a size that would hold ten pounds of grapes that would fit with select peaches. The object was to get a basket two layers deep of extra-choice peaches. We could not get it to hold ten pounds of grapes unless we made it too long and too wide to look well, so we decided on a basket that would hold nine pounds of grapes, and it will hold two layers of fancy peaches, will answer for other fruits such as cherries, and make an excellent basket for cherries. Then, there still remained another size, that is for a small grape basket. That basket is now coming in the United States to supplant the ten-pound basket almost entirely. A gentleman told me not long ago that he did not believe there were 100,000 ten-pound baskets made in the State of New York now, that this basket was used almost exclusively; and I presume we will find, as the years go by, that this basket will be almost exclusively used, that holds 2 2-5 quarts, about three pounds of grapes, gross. When these sizes were decided on, meetings were called in different districts, one at St. Catharines, one at Winona, and one at Fruitland, and these meetings agreed, I think unanimously, on those sizes of baskets. This matter came up in the House of Commons, and I had the honor of introducing it, and found very little opposition. The only opposition we got anywhere in the country was from a few merchants. The representatives from Manitoba had been urged by some wholesale merchants in Winnipeg to oppose it on the ground that it would interfere with their importations of American fruit. They did not, I think, read the Act very thoroughly, or they would not have raised any very serious objections to it, because it does not interfere seriously with the importation of American fruit. In the first place, it only refers to baskets, and most of the American fruit is brought in in boxes. Then in regard to the strawberries, the American strawberry boxes are mostly larger than ours. In New York State and Massachusetts they adopted a legal standard, and their legal basket is not quite an Imperial quart, though very close to it, so that the Act would not interfere with anyone wishing to import American strawberries. When their boxes are larger than ours, it does not interfere; we don't care how many boxes are imported that are larger than ours; but we do not want them sold any smaller. I pointed out in the House of Commons that it would not interfere with any Manitoba merchant, and we never had a single objection in Ontario, and the Bill was passed in the form that it is here, that I have described. This year was a very bad fruit year in some part of the Niagara District. In the eastern part of the district, where peaches are grown very largely, the crop was very light, and there are some complaints from growers that they would like to see this Act staved off for another year—it is to go into effect

from the 1st of January—as they have a large number of baskets on hand. Under the Act any sized basket is legal, but if the basket is not of the sizes mentioned, then the one who uses it must mark on the side of the basket what it contains, so there is no hardship to anyone who has a few baskets, or even a thousand or two; he has only to get a stencil and mark on the side of the basket what it contains. It must be marked in full quarts and below what it contains; for instance, if it is 10½ quarts, it must be marked 10 quarts. If there is any strong feeling among the growers in any part of the country to carry it off for another year, I do not see that there should be any serious objection to it. Of course the eleven-quart basket is larger by nearly a quart than the basket that is being used largely in that district.

Mr. Boulter: Will that hold seventeen pounds of peaches?

Mr. Smith: I should think so, but I could not say positively, as I never measured them.

Mr. Boulter: What is the size of the baskets we are using to-day?

Mr. Smith: The sizes we are using to-day are so various that you can hardly say that. The basket I am speaking of is used largely around St. Catharines and the Niagara District, that they call the eleven-quart basket, and it holds only a little over ten, and that is the basket that will come in competition with this basket if the Act is not put in force at once.

Mr. Caston: I have measured a great many of what are called ten-quart baskets, and they hold ten Imperial quarts.

Mr. Smith: That would be an eleven-quart basket, although they call them 12 quarts.

Mr. Boulter: Why didn't you adopt a basket that would hold a quart, or why did you not consult some men who were buying by the quart? We have the Imperial quart in Canada, and in the United States the wine measure quart. The baskets we have will hold about a wine measure quart. The canners must buy in some specific way; we cannot contract at so many thousand quarts per acre. We want to know what that quart means. We make a standard that a quart of berries shall weigh a pound and a quarter, and the ordinary basket filled up, as it should be, from the corners first, and not in the centre and tapering down in the corners, will hold a pound and a quarter. Now, why did you not consult some of the parties who were interested in buying berries? We would have been only too anxious to have a quart of berries in a basket. We don't want four-fifths of a quart.

Mr. Smith: You are not getting a quart now. This basket is exactly the size of the basket you are using now.

Mr. Boulter: When I am contracting with farmers, how am I to contract, by quarts or by pounds?

Mr. Smith: By boxes. The farmer cannot use any smaller box, unless he marks it on the box.

Mr. Boulter: I guess we will have to take the old principle of buying by the pound. I am sorry you have adopted a box representing a quart, that does not hold a quart.

Mr. Smith: Get five of those, and you will get four quarts.

Mr. Boulter: We don't want any friction. We have enough of that now with you fellows when we buy peaches. (Laughter.) This is a very serious question, this fruit packing, and I am glad we have our inspectors here to look after it. There is one way in which a strawberry box acts differently from anything else. You fill a strawberry box with gravel, and the bix stones will work to the bottom, and the little ones to the top, but with strawberries the box works the other way. (Laughter.) How are we going to contract for strawberries?

A Delegate: By the box.

Mr. Boulter: That is uncertain. If a packer fills the box up in the centre, and allows the corners to run down, you have not a half or three-quarters, let alone a box.

Mr. Caston: See that they fill them well.

Mr. Boulter : I think it is a mistake not to have a strawberry box a full Imperial quart.

Mr. Smith : Theoretically I agree with you. I would like to have seen it a quart, but on consultation it was found practically impossible to suggest a package that was very much larger than the one already in use. They very naturally said: "If you make those boxes to hold an Imperial quart, whereas the ones we are using now only hold four-fifths, we will get only the same price for them."

Mr. Caston : That is right ; you would not get one cent more for them.

Mr. Smith : So you have to adopt something that may not be thoretically correct, but is practically so.

The President : The Act has been passed, but it is not in force till the 1st of January ; that is the position. I may say that some of us used this basket this summer, consequently we sent out some thousands of quarts more than the others who did not. This is a great injustice. If the Act is not in force, will the basket manufacturers go on manufacturing the old baskets?

Mr. Smith : Some of them certainly will.

The President : I would certainly say, let it be enforced. It would be fair for the grower and fair for the consumer.

Mr. Smith : It will be enforced unless there is a petition asking that it stand over for another year, which there very likely will be. I should like to have the sense of the meeting so as to know what stand to take when the question comes up in the House to stave it off for another year.

The Secretary : I move that this Association approves of the work of this committee on fruit packages.

The resolution was seconded by A. M. Smith, and carried.

THE APPLE BARREL.

Mr. Caston : I would like to ask Mr. E. D. Smith about the barrel. Is there not an Act of Parliament altering the size of the standard apple barrel of this country to that of the American barrel, just a few inches shorter and holding a few quarts less?

Mr. E. D. Smith : There is an Act that makes the Nova Scotia barrel the legal barrel, but it is optional; you may use the old Canadian barrel if you like.

Mr. Caston : Do you think we should recommend that it should become universal?

Mr. Smith : I don't know ; that is a debatable point.

Mr. Caston : I think we should hear from the apple packers present. Our meetings have frequently expressed the opinion that Nova Scotia, the United States and Canada should have one size of apple barrel.

Mr. Smith : The American barrel holds six quarts less than ours.

Mr. Boulter : I don't know that our people get any more for packing their apples in these larger barrels than the Americans do for their smaller ones.

Col. Rogers : I think the barrels should agree in size with those of Nova Scotia. The Old Country market is guided greatly by the Nova Scotia product. That was an important shipping centre long before we attained anything like the proportions we have now. I speak as an apple-grower and shipper; we are at a great disadvantage in shipping a very large barrel when we actually ship in competition with Nova Scotian apples; therefore, I think we would be wise in adopting their barrel as a standard.

Mr. Smith : I may point out that most of our stave mills make staves to supply apple men in the United States, so that they have a stock of staves of the right size for us almost always on hand. The Act now provides that the Nova Scotia apple barrel is the legal barrel, but it does not make it compulsory; you can use the old Canadian barrel, that holds six quarts more. That is, you cannot use any smaller barrel than the Nova Scotia barrel, but you can use one as much larger as you like.

THE METHOD OF GRAFTING.

Mr. Morris (Fonthill) : All fruit growers do a large amount of grafting, and I have done a large amount, and do every year. The old system is to put the scions in one at each side. One of them has to be cut off, and it leaves a short edge there that would be a source of throwing suckers for years. Now, the plan that I adopted as an experiment last spring was to cut the limb off on a bevel, and then cut a little square off on the sharp corner and put one graft in there. Every good grafter ought to make nineteen out of every twenty scions grow. This method saves time. When that graft commences to grow the cut will commence to heal over, and it will not send out suckers as on the old plan. In this plan you should choose somewhat smaller limbs. You can notice in this sample how it has begun to callous over already, and in two years you will scarcely notice that it has been grafted at all. (Applause.)

Mr. Huggard (Whitby) : If you will call at my place you will find some trees that were done that way in 1896, and those trees have healed over in such a form that you can scarcely tell where the graft was inserted, the cut being made on the bevel instead of the square, and one of the trees this year produced over three barrels of apples.

Mr. Morris : I may say I never saw it done, and it was an idea of my own.

Col. Rogers : Do you advise paring the bark back when you finish a graft, or do you leave the limb as the saw leaves it?

Mr. Morris : I would advise smoothing it over a little with a knife.

Col. Rogers : I find some people who round it off nicely, which I think would hinder the healing process just that much. I like to use a fine saw and leave it as the saw leaves it.

BEES AND FRUIT.

By Wm. Saunders, LL.D., Director of Experimental Farm, Ottawa.

I want to show you, first of all, some samples of apples that were sent me yesterday by Mr. Hamilton, who has had charge of the fruit exhibit at Glasgow during the past year. These are apples that were grown in 1900, and kept in cold storage and shown during the whole period of the Glasgow Exhibition, and have endured the journey across the Atlantic without very much bruising, and are still in very fair shape, He says the two varieties were the Lawyer and the La Salle, but I think he has made a mistake in putting them up. I have the La Salle; it is a Quebec apple, which kept very well during the Exhibition at Paris last year; it was among one of the best up to a late period. It is not often we can see an apple so old as that and still in good condition.

Another subject is the result of some experiments we have been making at the Central Experimental Farm during the past year in reference to the question whether bees can puncture fruits or not. It is a question that has agitated the public mind for a very long period. More than a thousand years ago it was under discussion, and Aristotle, in one of his volumes, writes in defence of the bees, and says that the bee cannot puncture fruits to suck their juice, but that wasps and other insects can. Quite recently there have been some law suits over this quesiton, and while it seems as if it were not one of those things that admitted of very much that could be said against the bees, still the enemies of the bees have done their best under such circumstances. These lawsuits, have, I believe, all been decided in favor of the bee-keepers. From the structure of the parts of the bees' mouths it is very evident that there is no possibility of their biting a tough substance, or a moderately tough substance. such as the skin of a grape would be. The parts of the mouth. which correspond to those used in wasps for biting, and which in the case of wasps are larger and saw-like, and capable of seizing anything and tearing it. in the case of the bee are like two small spoons, and they only admit of a side motion, and when brought together they look in the microscope like two small spoons passing across each other, and they are used by the bee to manipulate the wax to build the cell and are not capable of being

used in any way to seize anything with a view of tearing it. In 1884 or 1885, when Prof. Riley was living, and had charge of the Entomological branch, the Agricultural Department of the United States undertook some experiments in Illinois, and they were carried out in this way: Fruit was exposed in a sound condition to the action of the bees, where they could get at it quite freely. Another lot of fruit was dipped in honey or a honey solution and also put in an open place, and another lot was subject to punctures at different points by a needle or a knife, and also put where the bees could get at them. These experiments were continued for some weeks, and in every instance the result was the same—the sound fruit remained sound to the end of the time ; the fruit which had been coated with sweets had every trade of sweet sucked off or scraped off the outside, so that there was no taste of sweetness left on the outside of the fruit, and those which had been punctured were more or less sucked dry by the bees, which had inserted their soft brush-like tongues into the interior and taken out the juice and appropriated it. These experiments, however, were tried by the Department of Agriculture in Washington in a closed room, which was covered with wire netting, so that the bees were confined to that room, and were not able to get out and in as they pleased. This last year at Ottawa Dr. Fletcher planned some experiments which were carried out by Mr. John Fixter, who has charge of the apiary at the Experimental Farm, and who is a very careful and painstaking experimenter, but in this instance the bees were allowed their freedom to go where they pleased, and go in and out of the hive as they chose. The time selected was the early part of September, when there was a great scarcity of honey, and none of the hives were making wax, and four colonies of the black or German bees were chosen, and the colonies were about equal as to strength. In two of these colonies all the honey was removed, and the frames put back as far as the honey was concerned, but three of the frames were fastened together with a strip of wood, so as to form a little chamber, and in this chamber were hung samples of grapes and other fruits, so that the bees would have them always before them during the time of the experiment as long as they remained in the hive. This fruit was in its natural condition, but it was carefully examined to see that there were no unsound tissues, and it was mostly grapes, and each of these two hives and this chamber filled in that way with fruit. In the other two hives there were five of the frames left with the fruit in them, and more or less honey, so that the bees had something which they could feed on for a short time. In connection with the second two hives, the small amount of honey was in the hive in connection with the fruit, but in those hives also there were frames tacked together and forming a little chamber in each to hang these little bunches of fruit. Then a super was put on each of the hives to form another chamber for fruit, and in one of these partitions were laid grapes and other fruit which had been dipped in honey, which had been warmed to make it thin and then the fruit drained. On the other side of the super the chamber was filled with fruit that had been punctured here and there with the point of a penknife. As soon as the arrangements were completed, and the bees had access to the hive, they at once settled upon this punctured fruit, and began to drink or imbibe the juices out of the grapes and pears and peaches and plums, all of which were represented in this experiment. They also clustered very thickly on the fruit which had been covered with the sweet solution, and rapidly consumed that Indeed, by the next morning there was practically nothing left of of the sweets that had been put on the outside of the fruit. They clustered also on the sound fruit and travelled over it and over it and over it again, but did not injure or break through the skin in any one instance. The bees were altogether kept in this way for a week, and at the end of the week the whole of the fruit was examined and found just as I have described. The fruit that was put in sound in every case remained sound, and the specimens that had been punctured had their juice more or less extracted, and the bees had been feeding on them in lack of other food, because honey at that time was scarce. Besides the grapes within the hives and in the super there was another lot of honey on a small Norway spruce tree, which was growing in the apiary yard, so that one-half of the tree was pretty well covered with fruit from top to bottom, where the bees had access

all the time. Another lot was put on shelves in a workshop that was close by, the windows being left open so that the bees could fly in and out as they pleased. They did not visit this fruit in the workshop so fully as they did that on the tree. They clustered around anything and everything that could be got to eat there, but the long and the short of the matter is this : That at the end of the week the fruit was all in the condition that I have explained to you. It was then thought best to continue the experiments for another week, and the punctured fruit and the dipped fruit was renewed, but the sound fruit was just as good as it was when it was hung out over a week before, and so it was left for a second week. There was a repetition of some of the movements of the bees clustering very heavily on the fruit that had been dipped in sweets and working their way into the fruit that had been punctured, but the sound fruit remained untouched, and this notwithstanding the bees were hungry, for towards the end of the second, and more particularly towards the end of the third week, a good many dead bees were found all around the entrances that had evidently died from starvation, and all this time there was plenty of food within reach if they could only have managed to get through the skin of the grapes. The third week the whole of the fruit was renewed, as some of the specimens were beginning to decay, and at the close of the third week it was thought not necessary to continue it any further, it being amply demonstrated that the results which had been obtained at former experiments where the bees had been confined were amply confirmed by these experiments where the bees were allowed to go and come as they pleased. I do not bring this before you as anything exactly new, but merely as confirming by more careful tests the conclusions which have been reached for many years past by thoughtful men, both pomologists and entomologists, who have studied the subject more thoroughly, and who have understood the structure of the organs of the insect ; and these new experiments amply confirm the conclusions which have been reached in the past, that the bees cannot, and hence do not, puncture sound fruit. They do, however, visit and injure considerable fruit that has been cracked, and in some seasons, especially in British Columbia, where they have a great deal of moisture, cherries have suffered very much from cracking, and then the visits of the bees in large numbers would injure the cracked fruit, but at the best the fruit was only injured fruit, and not of very much value. That is about all that can be said about the bees, other than this, that they have what is sometimes called a business end, which they use without hesitation on parties that disturb them, but that sting is designed for defence, and is mostly used for that purpose. You can very easily rouse some members of a crowd of bees to using their sting on you, if you only go amongst them and strike about here and there, as if you wanted to knock some of them down. Where they are in very great numbers, and where they swarm in an orchard there may be some trouble ; but, on the other hand, they are exceedingly useful to the orchardist, and very often give him a good crop of fruit where otherwise without their help the crop would be considerably less. They are very wonderfully made for one purpose, namely, the distribution of pollen. We know that plants require cross-fertilizing by the pollen of other plants if the vigor of the race is to be sustained. Nature abhors in-and-in breeding in almost every instance, and the result, if carried on, is a weakening of the progeny, and sometimes the gradual extinction of the species, or variety results. The important purpose that the bees serve in carrying pollen from one flower to another, and their great activity, the amount of ground that they can cover in a short time, and fact that when the bee is working on one particular plant he prefers to work on that particular plant, or fruit, or tree. These facts are all very much in favor of the bees when looked upon from the standpoint of the benefits they confer on the pomologist. The bee not only unconsciously does this cross-fertilizing by carrying the pollen from one bloom to another, but it also collects large quantities of pollen which would otherwise be wasted,and makes use of it as food. In the lower part of each hind leg of the bee there is a little cavity, which is known as the pollen basket, and by a peculiar arrangement of hairs on the leg the bee is able first of all to gather up the pollen on those legs and then comb it from one to the other, and the basket becomes full, and it carries it in that way home to the hive. Now, when a bee is working in an apple

orchard it gets plenty of nectar there and plenty of pollen, and it goes from blossom to blossom working away and knocking about the blossoms and covering the pistils with the pollen from other blossoms and other varieties of apples, and in this way works so busily all the time that a hive or so of bees in an apple orchard will probably accomplish more in the way of cross-fertilization than almost all other insects that would available at that time, on account of their great activity and the amount of ground they cover, and their usefulness is increased by the fact that they generally stick to one line of work when they undertake it, and when they work among apples the pollen is more easily distributed, and it is more effective in its result. As you know, I am not a special bee man, but I feel an interest in this bee experiment, and I always like to see justice done to every class in the community wherever they belong, and give them credit for the work they do. I think pomologists everywhere should rather encourage than discourage bee culture, looked at even from a purely selfish standpoint.

The Secretary: The bee has been accused of another evil, namely, carrying the blight from blossom to blossom when trees were affected with blight and allowed to stand in the spring and produce bloom. It has been stated by some American authorities that the bees visit the blossoms of the affected trees and carry the blight to those that are not affected. I would like to ask the doctor what he thinks of that.

Dr. Saunders: I think no doubt they could. So could other insects, and there are other insects visiting trees besides the bees and abolishing the bees would not abolish the blight, because other insects would carry on the work. If a pomologist allows blight to remain on his trees he must expect that a disease source of that kind will not remain long without spreading, and immediate action should be taken when blight is observed affecting the young tissues of trees to cut it off and burn it, because we know that it results from the small organization called a micrococcus—a very minute body which insects gather unconsciously in the nectar, and carry it to other blossoms, and in that way distribute it. But if you exterminate the bees it would be distributed by other insects. I have been very much interested in watching a flower for ten or fifteen or twenty minutes to find how many different insects will visit it in that time. If any of you have any doubts about the effectiveness of insects in assisting the horticulturists in cross-fertilizing you would be surprised at the number of insects, especially on a warm day, about ten or eleven in the morning, when the pollen is bursting most freely in the little capsules on the stamens of the flower, and you will find at that time the insects are busiest about the blossoms.

Mr. Morris: I have always been under the impression that the "Yellows" was carried from tree to tree and from orchard to orchard by the bees and other insects. I have seen a single peach on a tree affected with Yellows, and the rest of the fruit sound, as well as the tree itself, apparently, and sometimes I have noticed a few peaches on one limb affected, and I became convinced that it was the result of bees' work.

Dr. Saunders: With that I have had no experience. I live in a part of the country where, unfortunately, it is impossible to grow peaches, and we cannot even grow the trees, so we have no "Yellows.".

Cross-Fertilizing of Apples.

There was another topic on which I was going to speak, and that was on the results of the work that has been done in cross-fertilizing wild Siberian Crabs at Ottawa, with a view of producing apples which would be hardy enough to stand the climate of all the settled parts of the North-West country. This, as you can very easily understand, is a very worthy undertaking. Those of you who live in districts where fruit is abundant can hardly understand the condition of people who live far, far away from any such districts, who very seldom see or taste fruit unless they can afford to pay from $5 to $7 a barrel for apples, which most of them cannot do. Then many varieties in any case would not keep so as to bring them to the more remote districts of the North-West without spoiling. Almost every individual living, I think, appreciates fruit; there are very few indeed but who are very fond of it, and

desire a good quantity of it from time to time to keep their animal economy in a good state of health. Fruit is a very healthful article of diet, and there is no fruit quite so important as the apple; hence the early settlers of the North-West country, when they moved there and found good land, and what they thought was a very fair climate, sent to Ontario and the east for apple trees to plant out, thinking they could grow these fruits there by giving them a little more care and shelter than they would require in the east. But in almost every instance dead failure was the result of all these efforts. As a rule no variety of eastern apple will grow and mature its fruit in any part of Manitoba or the Territories, except in a very occasional instance, where the conditions of shelter are unusually good, or where the altitude of the place is low, that is, where it is not very much above the sea level. In the neighborhood of Winnipeg the altitude runs in the neighborhood of 700 feet above sea level, and in the district down about Morris, about 60 miles south of Winnipeg, and down at Nelson, we have experimenters at work who have succeeded in growing the Transcendent Crab. Sometimes they will have a fair crop on some trees, and they will grow the Russian apples, but these cases are exceptional, and when you come to Brandon, 140 miles, you are 1,200 feet above sea level; at Indian Head you are 2,000 feet above; and at Calgary you are 3,100 feet above the sea level, and it is practically impossible to grow any varieties of apple which we grow in the east over any of that district. When the experimental farms were established, one was established at Brandon, and another at Indian Head, by the Dominion Government, and we began a series of thorough experiments, testing every variety which promised to be hardy, and a good many others, indeed, which did not promise to be hardy, because we wanted to gather all classes of apples so that we might be able to say to settlers hereafter, if the experiments were well advanced, that it was useless to plant any of those varieties because we had tested them all. We tested during five or six years about two hundred varieties of apples, a large proportion of which were brought from Siberia and other northern parts of Russia and Northern Europe. We also tested all the varieties that had been tested in the Western States, so that the tests might be very thorough; and while we have tested thousands of trees at Brandon and Indian Head, of those 200 varieties of apples, beyond two or three little clusters of the Transcendent Crab, which we had at Brandon, we have never grown an apple from any of those trees. In 1896 some seeds of different sorts of shrubs and trees were sent to me from St. Petersburg from Dr. Reswig, who is Director of the Botanic Garden of St. Petersburg, and among these were some seeds of Pyrus Bacata, known as the Burrit Crab of Russia, and these seeds were sown and came up, and in 1899 some young trees of this Pyrus were sent to Brandon and Indian Head to be tested there as to their hardiness. At that time I had no idea of their value, except that as an ornamental shrub it blossomed freely, and the fruit was bright-looking when on the trees, but we did not suppose the fruit had any value. These trees were found to be perfectly hardy, and in four or five years they began to fruit, so that about 1893 or '94, when the hardiness of this very small crab had been definitely ascertained, experiments were begun at Ottawa in the way of cross-fertilizing this by operating on the pistils in the blossoms with the pollen from larger varieties of apples, using the Tetovsky, Wealthy, and Duchess mainly for this work, because these three varieties were very hardy themselves, and also using the pollen of the Transcendent, the Hyslop, and Orange Crabs, so that we might have a strain of fruit in that direction. Four years from the date putting out the yearling seedlings, 36 of those trees fruited, and when these fruits ripened we found that they were a great advancement on the original crab. One or two of them were just about the size of the Transcendent Crab, and in quality are better than that. These particular ones have been tested at both localities I have mentioned for two or three years, and have given no sign whatever of injury during the winter. The process of crossing was carried on until now we have crosses of from twenty to twenty-five different varieties of apples, taking all the leading sorts in cultivation, especially the hardier forms, and we have had altogether about sixty or seventy of those fruit every year; there are fresh trees fruiting, and out of those sixty or seventy we have some sixteen or seventeen that have been named, and nine of those include three or four of

those that are figured on the engraving I hold in my hand, and of the other newer fruiting trees nine of them were of that size and quality which would warrant us in distributing as fast as we can these young trees for testing in different parts of the North-West country. We have been trying to do that, but we have not been able, only having one small tree to cut scions from to make enough root grafts, yet to do more than place two or three trees here and there throughout the different part of Manitoba and the North-West Territories. But we have the trees established, and they are growing and doing well; and I have no doubt that within a few years we shall have, as a result of those experiments, useful sorts of apples, which, although small, will be very acceptable to those people who heretofore have had to send so far away for fruit, and will also help to remind them that there are such things as apples; and when they eat those which they grow at home it will only whet their appetite to buy more from Ontario of the better ones which they cannot grow at present, and give them a very useful and helpful addition to their diet, which is very much needed in that part of the country. In addition to this work of distributing the varieties which have proven themselves to be good by fruiting with us, we are also carrying on another line, that is, sowing the seeds of the best of the specimens of those fruits that we fruit, and distributing the seedlings in small quantities here and there over the country. We are establishing a very large orchard of them, one of two thousand trees, at each of the Western Experimental Farms. We have about 600 of them growing at Ottawa, and that is as much as we find room for, and now we are growing seedlings by the hundred, and we hope to grow them by the thousand and distribute little bunches of these to different people in different parts of the country, and when these fruit we shall have the advantage and benefit of many new varieties, which probably will be better than any we have sent out ourselves, for this reason; when you sow the seed of a cross-bred fruit, such as I have been describing some seedlings will sport back towards the female parent and some of them will sport towards the male. In all these cases we used the Siberian Crab as the mother, and have used pollen from the larger apples. Hence you see that any sporting in the direction of the sire will bring the larger fruit, perhaps a very much larger one, and a better fruit, and by multiplying the chances, by sending these young trees all over that part of the country, we shall within twenty years I hope see fine, useful varieties large enough to be of great value to the people, springing up here and there as a result of this work, all over the Dominion, until we shall have every part of the northern country provided with useful food of this sort. The larger crab shown on this engraving, which has been called the St. Charles, makes very good apple sauce. They all make exceedingly good jelly; even the smallest of them are perhaps better for jelly than the larger ones, because the pectin from which jelly comes is associated more particularly with the cores and skins of the fruit, and as these little apples are nearly all core and skin you can easily see that a pound of them will produce more jelly in proportion than a pound of apples containing a good deal more of the flesh. I have presented these two subjects because I wanted the Fruit Growers' Association to understand the important work that is going on in that direction, and I believe that it will be continued with the best results. The people all over the west are clamoring for these. They have been crying, "Send us some, no matter how small they are; let us have some of them," and letters such as these are coming from all parts of the country, so that we find it exceedingly difficult to meet a tithe of the demand, but we hope by adopting this process of disseminating seedlings as well as grafted specimens of those which we know to be of certain value, we shall be able to reach a large part of the community with these useful products. (Applause.)

W. A. Whitney: Dr. Saunders spoke of some of these seedlings sporting back to the male or female. He says if it is to the male they will be larger. Would the larger fruit partake of the weakness, say, of the Wealthy? Would it interfere with the hardiness of the fruit if it is larger?

Dr. Saunders: That of course cannot be answered very positively yet. My statement that these do sport back to the male very frequently is made on the strength

of some experiments we have been carrying on with some crosses in barberries, and also on the general experience of botanists. We take the Barbaras Splendia, which is a Japanese species, and cross it with the European barberry (Barbaras Vulgaris) with purple leaves that bears its blossoms and fruit on long clusters. When these two species were crossed we got four seedlings which were just intermediate between the two. There were not any of them purple, they were all green, they took after the female in that respect, but in the blossoms there were none of them single like the female, and none of them long like the ordinary purple, but they were a little less than half of the purple, and they were not like it in foliage and other characteristics. We have sown the seed of those. We used about 600 of those seedlings and about 25 per cent. of them have come purple, some of them a deeper purple than the original male. They have not blossomed yet, but from their growth and appearance it is quite evident that this proportion have taken the characteristics of the male in color, foliage and growth of plant, and no doubt when we come to fruit them them they will have those peculiarities also from the male, of similarities of fruit. As to whether these will be hardier or not if they partake more of the male characteristics we cannot say, but if half and half, if I may be allowed to use the expression, in the first cross they have shown themselves to be perfectly hardy, quite as hardy as the female, we have good hopes that if they sport a little more towards the male they will retain their hardiness, because we know that it would not require a great deal to add to the hardiness of such apples as the Wealthy and the Duchess and the Tetofsky to permit of their fruiting in Manitoba. because they occasionally fruit in the neighborhood of Winnipeg at these lower altitudes I have spoken of.

A Delegate: What seedlings do you use to make these grafts?

Dr. Saunders: The seedlings of the small Pyrus baccata, so that the root is the root of the female in each case. We have, however, tried a few of the Martha Crab root, and while we have not tested those sufficiently to speak very clearly on the point, yet we expect they will be just about as hardy, because the roots of the Martha Crab have survived at Brandon and also at Indian Head for a number of years, although the tree is killed back there more or less, killed back enough to prevent its fruiting, but the fruits are there.

FRUIT IN SIMCOE COUNTY.

By G. C. Caston, Craighurst.

I want to draw your attention for a few minutes to a section of the country that has not been noticed heretofore very much as a fruit growing country—that is the Georgian Bay District. I notice several gentlemen here that have come all the way from that District to attend this meeting—one from the County of Bruce and several from the County of Simcoe, where I live, and some of the most successful fruit growers of that locality. It is not a long time ago since it was thought that fruit growing could not be carried on very successfully very far outside of the Niagara Peninsula, but every year seems to demonstrate the fact that successful fruit growing is moving farther northward gradually, and it is moving farther north than any of the people had reason to suspect some years ago. Some people will be surprised when I tell them that on the shores of the Georgian Bay are produced some of the finest peaches that are grown in Canada. If you will visit the Collingwood show in the fall of the year you will find a dozen plates of fruit that, so far as size and appearance and everything are concerned, are as fine as anything you can find in Canada. That is pretty far north, but there are climatic influences that affect that part of the country. There is a strip, not as large as the Niagara Peninsula, not as large as the famous Bay of Quinte district, but still capable of producing fruits of the very finest quality. There is no section of North American were the climatic conditions vary so

much, especially as regards fruit growing as this Province of Ontario. That is on account of its geographical situation, being surrounded by its great likes and being like a wedge forced down between those lakes.

People will hardly credit the effects as to the variety of the climate for fruit growing. While on the Georgian Bay you can grow peaches, yet twenty miles back you would not be able to produce peaches at all; you would not probably get the wood of the trees to live over the winter. You certainly would not get the fruit buds to live over the winter. With regard to the capability of this Georgian Bay fruit strip for producing fruit, I want to give you some figures as to the size of the fruit industry, which is a comparatively new one there. The area with which I am dealing now is on the shores of the Nottawasaga Bay, which is a part of the Georgian Bay. Take, for instance, the Town of Collingwood, that has been famous for some time for the production of plums. Almost any variety of plums can be grown there to the greatest perfection and in almost any quantities. During the past year there were 80,000 baskets of plums shipped from the Town of Collingwood alone. In the neighborhood of Collingwood there are more than 25,000 barrels of apples yearly; this year there were 10,000 barrels shipped from that port, and this is an off year. In the vicinity of Creemore, take the section embracing part of the Township of Nottawasaga, part of the Township of Mulmer, and part of the Township of Sunnidale, there are produced in an average year from 35,000 to 40,000 barrels of apples and in the neighborhood of 130,000 baskets of plums. Farther north than that again we have Meaford, Thornbury and Clarksburg districts; in one year alone there were shipped about $80,000 worth of apples. Those of you who get account sales from Liverpool, London and Glasgow will find for years back quoted "Finest Georgian Bay product." which is a high compliment to that country as a fruit-producing country, because there are a great many barrels in Liverpool, London and Glasgow that are marked "Finest Georgian Bay product," that never felt the cooling breezes of the Georgian Bay. The soil in that locality is particularly well adapted to the production of the finest apples. The underlying strata is limestone. The soil in most cases varies from a nice rich loam to a rich clay loam somewhat rolling. Looking across the Nottawasaga Valley from where I live, what we call the Blue Mountain appears, to all intents and purposes to be a mountain grade. All up the sides of that mountain is the very best of fruit land, producing apples of the very finest quality. We have another advantage; in the spring of the year the prevailing wind is from the northwest, and the floating ice of the Georgian Bay is kept floating around there till late in the year, so that the trees are practically in cold storage, and the blossoming is kept back a good deal longer than it is in other parts of the country, so that they scarcely suffer any damage in the blossoms. Then across from Collingwood, and what we call the Cape, and across Georgian Bay and Lake Huron there are possibly 150 miles of open water, and during the winter the cold waves invariably come from the northwest, and in passing over that stretch of water the air for a few miles around the shore is tempered. When the air passes inland again it becomes much colder when it loses the influence of the water, but around the Georgian Bay we have not the same records of low temperature that we have a little bit inland. I notice the Mayor of Stayner here. He lives in the centre of one of the fruit districts. We have Mr. Cox, one of the most successful fruit growers in that district, and I would like to leave the discussion of this subject to them. During the last year they have succeeded in forming a local association in the Georgian Bay District. I think that is a grand idea. Fruit growing is going to be one of the greatest industries in the near future in Ontario, if it is not so already, because it has been truly and aptly stated that Ontario is destined yet to be the apple orchard of the world, and wherever the fruit districts are there ought to be an association in affiliation with this Provincial Association. I think with this local association we will be able to do a great deal more good than we can now. One grand idea in organizing the Georgian Bay Association was to co-operate in marketing and shipping fruit. There are hundreds of acres of that fruit land ready for the planter, and I do not think any man could make any better investment anywhere in

the line in agriculture than in some of that apple land, planting it out in some of the best varieties, and I think he would have a very sure thing for the future. I want to call attention to some apples that have been grown, some of them new varieties, in an experimental way. We hear a great deal about the Ben Davis Apple, and if you canvass the fruit growers of this country the invariable answer would be that they made more money out of the Ben Davis than any other they grow, because it bears so early, so abundantly, stands shipping so well, and brings such prices at the other end of the journey. But here is an apple that I think is going to surpass the Ben Davis. It is a better apple, and I think handsomer, the tree will bear just as early and abundantly—that is the Gano. That is one of the coming apples of Canada. I believe it will take the old country market possibly better than any other apple that has been introduced there for a long time. It is a better keeper, as it will keep until May or June in good condition, and the tree can be hardly distinguished from the Ben Davis, having the same habits and growth.

A Delegate: Is not the Gano generally said to be a seedling of the Ben Davis?

Mr. Caston: Yes, I think it is of that origin. The two trees planted in 1895 produced half a barrel apiece; this year the two produced a barrel of marketable apples.

Col. Rogers: At what age were they planted?

Mr. Caston: Either two or three years. Here is another apple sent out in 1995, a very handsome apple, the Boiken. I think this is going to be a very nice apple. It begins to bear as soon as you plant it out. You plant it next spring and it will begin to bear the next year, and it will keep at it right alone. The appearance of the tree is very much like the Golden Russet, and the bark and the habit of growth in the top very much resembles the Russet—you would think it was going to be a Golden Russet. That apple looks very handsome in a barrel. It is not affected by scab, and you can see by the state it is now in that it must be a good keeper. I think nearly every specimen on the tree was as highly colored as this one.

Mr. Bunting: The New York people had that apple in good condition in the month of July.

A Delegate: Is the Gano a good keeper?

Mr. Caston: Yes, just as good as the Ben Davis. I think it will be a compromise between the Ben Davis and the Baldwin.

Mr. NcNeill: I had a Ben Davis three months ago of 1900 growth without cold storage, grown in Collingwood.

Mr. Caston: Here is another apple called Downing's Winter Maiden's Blush. It grows a little larger than the ordinary Maiden's Blush. Here is another of the new varieties that I think is going to be a very good one. I think we should be very careful about recommending new varieties until we are sure that they are worthy of being cultivated. This apple is so new to me that I am not going to recommend it as yet, but I think a great deal of it and I think I will be able to recommend it. Here is an apple that most of you looking at it offhand might call the Northern Spy; it is about the same color and the same conical shape, it is the Salome; it is a good quality and a good bearer. These apples I have here have no scab on. If we can get an apple that is a good commercial variety that will sell well, bear well, that begins to bear young and is free from scab, those are great points in favor of them.

Mr. Boulter: Have those trees been sprayed this year?

Mr. Caston: Yes, of course, I always spray.

The President: Were there any other varieties scabbed?

Mr. Caston: Yes, some that were sprayed. I cannot keep the scab entirely off the Fameuse and the Flemish Beauty Pear if I keep a barrel under the tree and sprayed them every day. Here is an apple that succeeds very well in Simcoe, and I think all over Ontario. In the market I am catering to—Nipissing and along the C.P.R. and the Northwest—it is a very good article, the Fallawater; it is a cooker. I want to call attention to another thing. I have been preaching the top-grafting of

apples for a good many years, and I believed I was right, and I believe so yet, and the more experience I have had the more I am confirmed in my belief that we will succeed best in producing our best winter apples with regard to profit and high quality by top-grafting a great number of the best varieties on good hardy stock. Compare this Ontario apple grown on its own stock as it comes from the nursery with this one top-grafted on a nice healthy Spy seedling. Now you know the Ontario is a cross between the Northern Spy and the Wagener. Where it is top-grafted on a seedling it comes nearer the Northern Spy, whereas grown on its own stock it does not look so much like it. There has been a great deal of controversy on the subject as to how much the stock influences the fruit. We have been testing a good many Russians which Dr. Saunders kindly sent me some years ago. I found them almost invariably hardy, heavy trees with dark green rich foliage, free healthy growers; our great trouble is we have not been able to find a keeper. Some very nice looking apples, coarse in texture, too, of good cooking quality, but we could not get a keeper. This year I have fruited one that comes nearest to being a good type of apple. It is one that Dr. Saunders sent me about 1890 called the Bode. It is a summer apple. Among the Russians, here is the nearest approach to a winter apple, it is the Bogdenoff. It is an upright grower, thrifty, hardy tree, and it is the only one that makes any pretence at being a keeper that I have tried yet. It has nothing very much in the way of quality to recommend it. We have had great success with Russian cherries, which I believe to be one of the greatest acquisitions along the experimental line. They are succeeding admirably well. Prof. Macoun tells me that two-thirds of the fruit buds were destroyed at Ottawa in a temperature of some 20 degrees below zero last year. Not that he believes the 28 below zero destroys them, but the continued cold at that time. However, the lowest we had last winter was 20 below zero, and the fruit buds came out all right and produced an excellent crop of fruit, samples of which are upstairs.

A Delegate: What are the best varieties of those cherries?

Mr. Caston: There are a lot of good ones; it would be pretty hard to distinguish. The Ostheim is a capital cherry, almost black in color and one of very great excellence as a canning cherry. It is perfectly hardy with me, and is a fairly thrifty grower. We have two or three Russians under the name of Orel. We have the Brusseler, Braun and the Amarelle. In point of early bearing and productiveness I don't know that there is anything among them that will beat the English Morello, but there are a great many fine Russians. I could give anyone a list of four or five that would be suitable to plant in any section of Canada.

Mr. Smith: Are Richmond Ridge and Mortmorency not suitable?

Mr. Caston: Yes, but we have two or three others that are better for culinary purposes. I want to say a word or two about an old familiar apple that I call the first commercial apple in Canada to-day, that is the Northern Spy. (Hear, hear.) We cannot produce too many of them in this Province of Ontario. We do not get enough of them. Some people say it has a tender skin, that it does not stand the package barrel very well, but we have not half enough in this Province to-day. One of the first things that will be said about that is that it will take too long, from thirteen to seventeen years, to come into bearing, which is true, but I have seen them heavily loaded in five years from the grafts. The way to grow that apple is by top-grafting it on some hardy seedling. I have been top-grafting for twenty years, and I would say top-graft the Spy on something hardy and do not be afraid of getting too many Spys—you cannot have too many. These Spys will sell like hot cakes in New York and Chicago and all those large cities, because we grow a better Spy in Canada than they do in the United States.

Mr. Jones: How long have you had those Northern Spy top-grafted trees bearing?

Mr. Caston: For several years.

Mr. Jones: Can you give us an estimate of what a full-sized tree of twelve or fifteen years from the graft would yield?

Mr. Caston: You would get a very large crop, probably four or five barrels from the tree. You know when the Spy does bear it bears a very large crop.

A Delegate: Do you find the Spy an annual bearer?

Mr. Caston: It has not been with me, but it is getting to be so.

A Delegate: Is there anything in the idea of taking scions from individual trees?

Mr. Caston: I believe that it is a fact that there is individuality in trees as well as in animals and men; and you can perpetuate that individuality. For instance, you have noticed a row of Spys or some other variety with the trees as near alike as possible, from the same nursery and planted and grown under the same conditions, and yet you will find some individual trees, and you can perpetuate that individuality by taking scions from that tree and using them for top-grafting.

Mr. Boulter: Is the Ben Davis a hardy tree?

Mr. Caston: No, it is only about half hardy with us.

Mr. Wm. Rickard (Warden of Northumberland and Durham Counties): The matter that has been brought out last is very important, and if I had been better advised along the lines that have been discussed to-day I would have been better off. What has been said about the Spys is all very good. I would like to know what Mr. Caston considers the best kind of stock to top-graft on.

Mr. Caston: Almost all those Russians are good stock. I have found that the Spy did remarkably well on Yellow Transparent, yet I think for all purposes, if I were selecting any particular one I would take the Talman Sweet. (Hear, hear.) I will tell you the reason. You have there a thrifty tree. You won't have any unsightly bunches; the union will be more perfect than with any other variety I know of; I could show you in my orchard places where you could hardly tell where the graft was put on. It seems to make an almost perfect union with almost any variety. It has a hardy trunk and a hardy root; it has a spreading habit of growth, and another important thing is that the limbs are well knit into the trunk ,and they will bend to the ground before they will split, which is one of the greatest faults of the Spy which I notice in the Bay of Quinte district—the decay seems to get into the crotch, and you will find a great big branch fall off, and in another year or two another branch will fall off.

Mr. Sherrington: At what age or size would you have this stock for top-grafting?

Mr. Caston: As soon as the tree is old enough to hold the graft; that is if you are cleft grafting. Never cut the whole of the top off the graft in the limb; take only about a third of it off at a time and then you do not disturb the growth of the tree.

Mr. Shepherd (Montreal): I should like to give you my experience with the Spy in the Province of Quebec. My orchard is situated in the county of Vaudreuil. I planted one Spy tree for experimental purposes twenty-six years ago, and it only bore for the first time three years ago. Our climate is very much more severe than yours. That tree was killed down to the snow level three or four times, and the following spring it shot out above the graft, but the fourth time I was particular in training it and heading it in. It was not until the fourth time it began to shoot out from the graft that the tree began to get acclimatized, and now the tree is about the size of a Fameuse tree that has been planted for twelve or fifteen years, and last year I got off that a barrel of very fine Spys indeed. I merely tell you this to show you that we cannot grow Northern Spys in the Montreal district unless we top graft. I have not had much experience with Talman Sweet as a stock, but I have had experience with Switzer. McMahon is one of the most admirable stock we could have for top-grafting. We cannot grow the Northern Spy on its own root. We count the Northern Spy your best winter apple. In Montreal when people want a first-class winter apple they always ask for Northern Spy.

Prof. Waugh: I may say that the problem of hardy apples has not very strongly interested us in Vermont, because in our principal apple-growing regions we are growing all the common market varieties, and for the most part grow them on

their own stock. The Spy, which is grown there largely, is seldom top-grafted, but is grown on its own stock; that is, grafted or budded trees are put out and people wait until they come to bearing. About fifteen years is supposed to be the time for Spys to come into bearing, and fairly good crops are got after fifteen years. I think the experience we have had in top-grafting the Spys and other varieties of that sort has convinced growers that it is better to top-graft Spys and other varieties which make poor trees, such as the Spitzenberg, which is a very fine apple and sells possibly better than the Northern Spy. The Spitzenberg brings very high prices. They used to be grown quite extensively in our neighborhood, but the trees are poor, short lived, subject to apple canker, and they die out, so that they have been almost given up by the growers. A few growers, however, who have some faith in this matter of top-grafting and have seen the benefits from it from the experiments they have made, are now going ahead and putting out considerable orchards of trees for top-grafting and are grafting over considerable quantities of trees they already had. Sweet apples were grown to a considerable extent, for example, Talman and Pound Sweet. In recent years the apple maggot, or Colorado worm, has been very bad indeed, especially on those sweet apples and especially Talman Sweet, so that it is nearly put out of the market, and the easiest and the quickest thing to do is to top-graft those trees, and considerable experiments have been made on that account, and these have been put in largely to Spitzenbergs and Kings. The King makes a poor tree, but they can be made fairly productive, and good fruit can be grown by a suitable method of top-grafting, so that these tenderer and, in many cases, much better varieties are now very largely grown in that way. Dr. Hoskins, who is well known by reputation, did a great deal of experimental work in the matter of hardy apples. His experiments were very interesting when they were being carried on. I am sorry to say that they have been given up now. The varieties which he tested and recommended are almost lost sight of in the State, not because his experiments are discounted, but because the district which he represented has never taken up the business of apple growing seriously, and because in the real apple growing districts the plainer varieties may be grown with practical certainty. His experiments have merely had the effect of demonstrating that apple growing can be carried on anywhere in the State of Vermont if a man has brains and energy to put into it. He had one of the most exposed situations in the States, clear to the northern line, at an altitude of 1,200 to 1,400 feet, and yet he made an admirable model commercial apple orchard there. (Applause.)

Mr. Morris: I am a great believer in top-grafting trees, but I do not think that the Talman Sweet is the best tree for that purpose, and as for the Russians I would not use them at all, they are too liable to sucker from the root; even Tetofsky and Duchess of Oldenburg do that. There is something about the union of the root there that causes them to sucker. First of all I would take a fine grown tree and graft a coarse grown top on it, so that there would be more check to the flow of sap, which would throw the tree into fruitfulness.

Mr. Caston: You will not get a much closer grown tree than the Talman Sweet, a hard, close-grained wood.

Mr. Morris: But the Talman Sweet is not a fast growing tree. Take a tree like the Jacob Sweet, the Early Strawberry, McMahon White—the trees are all considered fast growers, heavy, close wood, and they all make far better trees than the Talman Sweet.

Mr. Morris: I have something to say about the individuality of trees. Did you ever examine the soil those trees were in? I think you will find some bone there, or some manure pile. If one tree is specially fruitful, perhaps you will find that it has been barked. We all know that ringing the bark of a tree will throw it into fruit perhaps two or three years earlier.

Mr. Boulter: There is no trouble to get that done. (Laughter.)

Mr. Morris: Anything that stops the flow of sap will throw that tree into fruitfulness. You may take your knife and cut the bark around the limb and check the flow of sap; and the fruit buds will form around that limb.

Mr. Rickard: If Mr. Boulter will come up to our place I will give him an object lesson on the individuality of trees. I have in my orchard some sixty or seventy Northern Spy trees that have been planted a little over twenty years. One portion was planted two years before the other and they grew a very excellent Spy. Out of the 1900 crop some went over to Buffalo last May. The others were planted two years afterwards. The nurseries from which the two sets of trees came were a mile or two apart. Now I have three rows of fifteen trees to the row, about forty-five trees, about thirty feet apart each way. I can assure you there are no bone piles nor ash beds, the soil is identically alike, but the apples are distinctly different. I can go through and point out one tree that will bear a great many more apples than a tree thirty feet from it; they will be as large, they will color better and they will keep a great deal better. You may talk about two different kinds of Spys if you like, but they are radically different in every way; the others grow large, but they will never color, some of them will turn white, some of them will color a little. In 1900 I shipped to Glasgow some of those large over-grown Spys that did not color, and they did fairly well, but now here is the point, as to the keeping; those Spys that I spoke of first grew on one tree that is a little further to the west, within thirty feet of the apples that do not color and that will not keep; and I put them into the cellar to keep, and some of those apples would not keep, they were so radically different from the others that grew within thirty feet and under the same conditions. In shipping these apples by some mistake two barrels were overlooked. I picked them over and there was only one barrel out of the two, that is, there was one half rotten. Now at the same time I had in my cellar some twenty barrels of the sound variety of Spys which I took up; and they did not average six rotten apples in the barrel. However you have a mind to put it, I have come to the conclusion I would not plant a Spy tree from the root if you gave it to me, because I do not know what it would do. I would immensely rather plant something that Mr. Morris or Mr. Caston has mentioned and know where I took my scions from, because if I were going to take my scions from my orchard do you think I would take my scions from this tree when the fruit might never color well? Here is a tree thirty feet from it that will always color and keep well. Where will I take my scions from? I am as fully convinced of the individuality of trees as I am of animals or men or women.

Mr. Smith: Do those Spys run alike all the same through the row coming from the one nursery?

Mr. Rickard: It so happens that in 1874 from a certain planting they are all good and they bear well, and then, next to that, more being planted in 1875, there is one tree in that second planting that stands 30 feet from the other trees that is of the same variety as those planted in 1874, and it stands there while the good Spy stands to the one side of that. This one tree is at the end of a row, and the row runs right through, but they are all of the same inferior apple, the kind that does not keep.

Mr. Smith: The whole row?

Mr. Rickard: The whole row except this one tree.

Mr. Sherrington: I wish to corroborate what what Mr. Rickard says to the individuality of trees. I have the same circumstances in my orchard as he mentions, as I can show you by my samples upstairs. I have half a dozen Spy trees under the same treatment, soil and everything, and the apples are entirely different. One variety grows very large and it does not color, and it does not keep; the others of medium size color well and will keep till late in the spring, of the best quality. I don't know how it occurred.

Mr. Saunders (Mayor of Stayner): The address of Mr. Caston provoked, I think, a most profitable discussion. We have all learned something from it, I am sure. As the President of the Georgian Bay organization I must make myself known to the parent body here. From conversations I have had since coming down east here I think it is gradually dawning on the eastern people that the Georgian

Bay district is really the Garden of Eden. (Laughter.) Simcoe County, of which Mr. Caston spoke, is only a portion of the Georgian Bay district. Put in a nutshell, the Georgian Bay district is composed of the counties of Grey and Bruce and Simcoe, and the further north you go the better apple-bearing section of country we have. We have been very backward there in taking united action regarding the handling of our fruit. I have lived in that district all my life and know something of the fruit growing of it, but, like the fruit grower of the Garden of Eden, we have been handicapped; the transportation charges have been so terrible that, like him, we never shipped any fruit. It has been customary every year for an apple buyer, a goodlooking fellow with a smile and a joke and a laugh, to drive up to the farmer's yard and say,—"I will give you 50c a barrel for your fruit." Which of you farmers down here would sell your fruit for 50c a barrel? Now we have become awakened to the fact that some change must take place, and last April, after consultation with a number of fruit growers in the district, we formed an association, but little has been done since. The season has been against us for apples, and plums are the only things that we are prepared to sell, and those would hardly bring any price at all, but our purpose in being present to-day and in organizing is to be identified with the fruit growers all over the Province. (Hear, hear.) The Georgian Bay district is of very much more importance than I can portray to you, when I tell you that plenty of farmers up there sell their orchards off-hand at from $1,000 to $4,000. That would indicate a large fruit-growing section, wouldn't it?

Well, I have seen year after year, and especially the past season, orchards there with probably 500 or more barrels of excellent fruit lying upon the ground going to waste, and the pigs driven into it. Now, we want to remedy that state of affairs. I am glad to say that enough interest has been taken for four or five of us to come down here and hear what the parent body is going to do; and we give you early notice of the fact that I would like you to listen to the representative of this delegation and bring your body up to meet with us next year, come into the best fruit-growing district of the Province. (Applause.)

Mr. Cox (Collingwood): I have been in the fruit business all my life. Some years ago I went security for a man for $4.000, and I had it to pay, and it made me a poor man. Dr. Aylesworth asked me if I would put out an orchard for him, and I agreed to. I put it out in the Georgian Bay district. I stopped there ten years. I bought the place since. There were 36 acres. Before I went there I said I would not have the place if anybody gave it to me. When I came to put out the fruit I changed my mind. In the ten years I was there there were 100 acres that Hon. David Reesor had bought to make a deer park of, but he gave up the notion, and I bought that of him, and moved on to it. I put out 500 Spy trees and 1,000 plum trees. I found a difference in these Spys, and I was convinced that there were two different kinds of Spys. I have heard many a man say, going up the road, "That man is a fool: he will never make a living there, he will starve." but I have not starved, and I never missed a meal, and the place is paid for, and there is not a cent against it, and I have a little besides. I have fruit houses on it, and a barn and a stone cellar. I tell you there have been lots of drawbacks, but we can grow fruit there if we work; we won't get it if we do not work; I know that. I went across to England last year. I had not been across for forty-two years, and I saw there some fine Spy apples that were sent from there on the 23rd May, and they seemed to be just as fresh as ever then; so our quality of apples will be all right. When I got to Northampton I went to see the Mayor. He had about 200 men, and is a wholesale and retail fruit merchant, and he said, "I do not know that we ever got any fruit from Canada, but we have got some splendid Spy apples here; come and I will show you." I saw them and said, "Those are not Northern Spys." He said. "Oh, yes." "Where did they come from?" I asked. He replied, "Tasmania!" They were as green as any Mann apple I ever saw, but they were boxed up beautifully and looked nice. I sent 12 varieties of apples to Baron Rothschild, and I got letters from him and the Duke of Bedford and Lady Duncan Stuart; they said they

never saw such apples in their lives, and did not know there were such apples grown in the world. I tell you we do not advertise enough; they do not know what we have got; they have no idea. We have ravines up and down the side of this place. I have some of them in cherries, some in plums, and I have got every inch of ground that I can possibly put into fruit. I say, "I will not plant any more, I think that will do me." But, nevertheless, I generally get 400 or 500 trees every year and put out; I am very nearly 70 years of age now, and I suppose I will put out trees if I live to be 90. I have another hundred trees coming in the spring, although I generally plant my trees in the fall. Three years ago I was offered $3,010 for the apples alone on the trees on that 36 acres, and I told them they would have to pay for their board too. (Laughter.) I always charge the man that buys the apples for his board; then he gets away quicker. (Laughter.)

Mr. Caston: How much did those apples actually amount to that year on the 36 acres?

Mr. Cox: Well, I have never told anyone really that, but I made a little over $4,000 out of the apples, and I had only paid $4,500 for the place. (Laughter.) Another man had bought the place and could not pay for it. If any man puts out an orchard and thinks he is going to have an easy time of it and make a fortune he is very much mistaken. I went to look at a farm for a friend of mine, and the lady said, "You know we have come to these 28 acres; we have sort of retired." I said: "Retired in an orchard?" She said: "Yes, we had 200 acres, and sold that and thought we would come here and rest easy." I said: "You have come to the wrong place, to a fruit orchard, to rest easy. If there is any place where a person ought to be active it is an orchard: I can hardly sleep at nights." This year we had a light crop, about 400 barrels of apples, and we should have had 4,000 more than that. The peaches, apricots, cherries, and plums were immense; I never had anything like it. Yes, we grow peaches there, too.

EVENING MEETING.

On Wednesday evening more addresses of welcome were given by representative public men of Cobourg and vicinity, Mayor Huycke, Warden Rickard, Senator Kerr, and Mr. J. B. McColl, M.P. To these very interesting and eloquent addresses a suitable reply was made on behalf of the Association by Mr. T. H. Race of Mitchell, an ex-President of the Association and a former resident of Cobourg.

COMPARISON OF CANADIAN AND AMERICAN FRUITS.

By Prof. Van Deman, Washington, D.C.

After a reference to the good feeling existing between the two countries, the speaker proceeded to say: Down at Buffalo we were associated all this past summer with some gentlemen that I see before me here, and I shall look back to that time as long as I shall have the use of my mind as being one of the pleasantest friendships that I have ever yet made with these very Canadian people. I have been asked this evening to talk to you something about the comparison of your fruits with those of our own country, and as I look at the question I can say that I see very little difference really between the fruits of Ontario—and I may include Nova Scotia as well—and those of our northern States, particularly the New England States, New York and Michigan. Of course when we go farther west and south there is quite a change, but in the territory mentioned we grow just about the same fruits as you; and I may say—and I say it with all candor—that I think that your apples and peaches and pears and grapes and the berries—I guess that is pretty nearly the whole list—are just as good as any that grow anywhere in the world. (Hear, hear, and applause.) Your Canadian apples are as good as any that I ever tasted or ever looked at. Perhaps there are some in the far west that are a little more hand-

some, but take it all in all, your apples ought to bring, and do bring about the very highest price of any that can be sent to market from any part of the world. I have never travelled in Europe, but I have had apples sent to me from there when I was in our Government service, and I have seen them elsewhere, too, from England and from France and Germany, and from Tasmania, and I say that North America is the home, above all homes, of the apple—(hear, hear)—and while they do grow some very good apples in England, still when we send ours over there they will pay a better price for our apples than they do for their own. That is true ; and why ? It is because they are better. Now, these banners representing medals have been referred to. I am happy to say that every one of those I awarded myself—(applause)—and I did it only after the most painstaking examination of every exhibit that came in. I am certain that those who are here who had charge of the Canadian exhibit, and who managed it so ably—(applause)—with Mr. Bunting as their chief—and of course the other officials of this Association were back at home gathering up and sending forward—will testify to the fact that every one of those medals was awarded only after careful examination of all that you sent there. I am proud to say that the Province of Ontario came only next to the State of New York—(applause)—and of course you would not expect but that New York, being right at home, and with an ample fund behind it, would make the largest exhibit at the Pan-American. But you Canadian fruit growers have reason to feel proud of what you did at Buffalo. It was a beautiful exhibit from first to last. There was not a day when the Canadian fruit tables did not look very well, for I was there every single day but three and a half from the time the Exposition started to the close, and I know that the Canadian exhibit was first-class. (Hear, hear.) Now in making comparisons I may mention some differences which exist on our own side of the line, as suggested to me by your Secretary. The eastern people have long been thinking that they ruled the apple market, and so they have. Western New York, for instance, has for a good many years largely ruled the apple market of the United States ; they have exported more to years largely ruled the apples market of the United States ; they have exported more to Europe than any other part of the country. But the Western States are coming to be a very important factor in the fruit commerce of the country. Their apples are now coming eastward, and they are of such a high character as to color and size that they are making the eastern folks prick up the fruit growers from Rochester when he was looking at the fruit from the Territory of New Mexico, not yet dignified as a State. He said to the gentlemen in charge, "Now we are not afraid of you, but we are afraid of your fruit. When I see such a display of apples as this from New Mexico—and you say that you can raise them there by the carload or by the trainload like that—it makes me feel that maybe I had better sell out my farm and move out West and go to raising apples out there." And that is a feeling that is growing in the United States. I do not know that it is growing so much in Canada, because when we go westward into British America we go chiefly into the mountains and though I have never had the pleasure of travelling through British America, still I know that your territory there for apple-growing is comparatively small, or for fruit-growing at all. I have been invited by the C. P. R. to take a trip through there next summer, and I mean to do it ; I want to see what is going on there, and what the prospects are, and I want to visit Nova Scotia, but I have no doubt that I shall find a great many things there that I do not expect to see, and that is what I want—to broaden my scope, and to know better and better as time goes on just what we are growing in this great country of North America. The region of what we call the Northwest—that is, Oregon, Washington and Idaho and a part of Montana—is at the present time becoming one of the best apple-growing regions of the United States. The trees come into bearing there very much earlier than they do in the Eastern States. They bear much more profusely when they do begin to bear, and in fact one of the great troubles is that they bear too well; they load the trees too heavily, so that it shortens the life of a tree. Why the profitable life of an apple tree in the State of Kansas and Nebraska scarcely ever exceeds 25 or 30 years. The apple trees began to bear out there so early that I am almost afraid to tell you how early they do begin. I remember the biggest laugh I ever

raised was at Rochester, N.Y., at one of the horticultural meetings. I was talking about this same subject, or something like it, about how early some trees begin to bear in the orchard of Judge Wellhouse, who is called the Apple King of America, and someone asked, "When did they begin to bear ?" and I said, "The same year he set them out." Now, then, he got one apple from a tree—he got two or three bushels of apples from trees he had set out that same year. It is a common thing in Idaho and Washington for trees to bear the second and third, and surely the fourth, year from the time they are set out. They would be surprised if their apple trees did not bear in four years. I take it the same thing exists in the southern part of British America. Of course Prof. Saunders has travelled over there and knows.

Prof. Saunders : That is so, sir.

Prof. Van Deman : I know that is the case, and while you may not have much to fear, I do not know how much you have to fear. We want to take a little tip from those western people, and that is about the kind of fruit we pack and ship away. There has been something said about that law of gravitation in an apple barrel, and I think that is one that needs to be pretty well shaken up, too. We want to fix that apple barrel so that there is no evidence of gravitation in there at all. We want to have as big apples in the bottom of the barrel as we have at the top, and that is just what those western people do—they have their fruit running through the box all the same, and they do not use barrels at all. (Hear, hear.) I think that is a better way ; I think a box is a better package than a barrel. (Hear, hear.) They have them all alike just through and through ; I have never seen any variation or deviation from the rule of even grade of fruit from top to bottom. (Hear, hear.) They have them all alike just through and through ; I have never seen of stuff down at the bottom that there is in the top. ("That is right.") It does not pay to try to cheat somebody else, because when you do you are simply cheating yourself. perhaps not in that particular case, but in the end it will be a losing game on your part. That is the doctrine that will be preached, and preached until people find out that it really does pay to do right a good deal more than they do now. Not that everybody does wrong, but there are a great many that do, and that is one of the things that we want to take account of when we think of those western fruits; and if we will catch on to this box business, too, I think that is another thing. I do not know how much of that you are doing here in Ontario, but I know there are some who use boxes for packing fruit, and I think it is the best package, while of course that is a thing that will have to work itself out. The markets themselves will prove what is best for you to send. but I advise everyone who is shipping to at least make the trial of the box instead of the barrel. Now there are two or three things that I think you can gain by a comparison of the eastern and western methods, and one is the manner of growing the trees. As a rule in the Eastern States they want to train their trees so high that they can run a horse under without ever touching the hames of the lowest limb. Now I think that is a very great mistake. Of course the western climate is not the same as the eastern. They have more snow and more wind, and the soil is somewhat different, and they have several problems that we do not have in the east; but at the same time I think we ought to lower the heads of our trees more than we do, as I think that you ought, and I think that the best orchards I have seen in the Province of Ontario were those which were trained rather low. Of course you would not grow a Spy the same as a Talman Sweet. You must have a spreading one lower than one that has not a spreading habit. Then there is another thing that they do west that we do not do as much as we ought, and that is to prune back, especially the peach tree. Such growers as Mr. Hale of Connecticut, and Mr. Morrill of Michigan, and some of those men who are really the criterions of the business, constantly prune back their peach trees. They do not skip a single year but they keep cutting back so as to head the trees rather low, and a large part of the fruit is gathered standing on the ground. I know orchards in which the step-ladder is not used at all ; they never use anything more than a little bit of a hook that they reach up and bend down the branch with, and once in a great while they have to stand in the forks of the trees and gather the peaches. Then there is one thing more that they do

that we do not do, and that we ought; I refer to the thinning of fruit. The thinning business began in California, and, as I have said in various State horticultural and other meetings in our own country, if we expect to beat the Californians in our own eastern markets we have got to beat them at their own game—to take the same plan that they do exacly. Mr. Hatch of California, one of the largest peach growers that ever planted trees there, experimented from year to year until he found out just the right distance apart, according to his conditions, to grow peaches, and he found out that the width of a Chinaman's hand—they use Chinamen there for laborers—was the right gauge, and he never leaves the peaches so close that the hand would touch them on both sides. Mr. Morrill of Benton Harbor, Mich., has increased the distance to ten inches for his high grade peaches, and the consequence is that Mr. Morrill has sold peaches for figures as high as $7.50 a bushel. Of course that is an extreme case, but he has sold a great many peaches at that, and Mr. Hale of Connecticut had six inches for the distance for thinning his peaches until within the last year, when he said he had raised it to eight. We are just beginning to learn that we should thin out our fruit and not grow so many seeds. There are lots of fruit growers who, when you come to think of it, are more in the seed business than in the fruit business. (Laughter.) Do you know that it costs the tree more vitality to make the seed than it does to make the flesh around the seed. The principal ingredient in the fleshy part of the fruit is water, and the seed contains the potash and phosphoric acid, the highest mineral elements to make the fruit, so let us grow more fruit and less seeds. Regarding those people who are training their trees away up high, I have sometimes thought they were in the forestry business instead of in the orchard business. I have seen apple trees in the State of New York that were twenty feet high before you came to the first limb. Now that is nonsense, that is folly, growing such apple trees as that. Why, they do not get anything but a few little scurvy things away up there that nobody can climb high enough to get hold of. When we want to thin an orchard that is too thick, instead of cutting off the lower branches let us take the heroic course and clean out a whole row, and if necessary go both ways, and take care of the rest of the trees, and get more profit out of the one-fourth that is left than out of the four-fourths. (Hear, hear.) That is one of the things that they do in the west—they grow their trees so low that they can gather the fruit easily, and they train them so and cut them so that they have plenty of room to grow sideways, usually leaving rows wider east and west than they are north and south. I think that is the preferable way; and then they thin the fruit so that they have fruit to send to market instead of seeds. (Applause.)

OUR FRUITS IN THE BRITISH MARKETS.

By J. W. Robertson, Commissioner of Agriculture, Ottawa.

After some introductory remarks regarding the relations existing between Canada and the United States, and the possibilities existing for development in this country, the speaker proceeded to say: Every man who knows what life means knows the value of meditation. I have known people who were so trained to read that they read all the advertisements in the papers as well as the news. They get something before them in the train, at the office and in the parlor to save themselves from the vacuity of one's own company. Let a man begin fruit-growing and he will begin and think, think, think. Capital! Then he will read with more interest and more profit. Then I want to say this, further, that he will have to get a wider knowledge of nature and plant life and insect life, and also of climate. In that way he becomes a man whose common sense is widened, and whose fairness and judgment are greatly increased, and those two things make for happiness and good citizenship. I would like to see that same sort of thing at the bottom and beginning of our school system. It is coming in England, Germany, France and every country that is beating us in the markets. We don't

care about being beaten in our intellects and social life, but when we are beaten in the markets it will waken us up by the practical quality of the education of our youth. In Germany they have two thousand gardens where boys are trained to grow fruit, develop observation and reflection and exact knowledge of nature, and learn all about them. To grow fruit and market it every man needs knowledge; not merely knowledge, but practical personal ability. Whoever could make a thing grow well, the apple tree the shape of his thought, the apple itself partaking of the quality that the climate will permit, could not do this unless he had practical ability ; and what is the use of him having these things to represent them, the examination ?—because life does not set a man an examination, it sets a man a task and says, "Do it or —— !"—(laughter)—and a man does not get a chance if he fails the first time. People will say somehow he didn't get on. Ah, you did not get another chance ! And that practical personal ability to manage a flower, manage a plant, or manage something for oneself gives you a responsibility and ability that is good anywhere, whether it be in the market or in the field of South Africa, where the Boer has shown personal practical ability to our shame. The indivdual man, with his personal practical ability, and sense of responsibility that made us send ten men to one to do the job at the command of justice and righteousness ! We had right on our side, but he had practical personal ability on his, and we should have that in our country, and fruit-growing would help us out of it. Then we want co-operation between the fruit grower and the fruit transportation companies and the fruit salesman. How does that affect our fruit business ? Take the home market, and my friend from the United States has very clearly said that the western fruit grower puts the same kind of fruit all through his package, and I go to Winnipeg and the men there say, "We would not have Ontario apples if we could get them from Washington, because the Washington boxes are the same all the way through." I did not say that, but the Winnipeg merchants drum it into me every time I go to the city, and back it up by sending me long letters. Co-operation is good for the man who packs as well as the man who eats, and it would pay us to have our fruit of a poor quality, for some poor fruit grows on trees, but have that fruit the same all through the package. A man is satisfied if he gets it all of the same value. That co-operation would help us to capture our own markets, that are slipping from our grip in the Western Territories of our own country, just because those people say that packages from the States are the same all the way through, and ours are not ; and I have seen some of them to back up their statements. Then what shall we do about the English market ? The same thing is true there. If an Englishman wants a good thing he will pay a good price, but he wants it the same all the way through. Now we do send a lot of good fruit to England. I tell you what happened this year. The Secretary of the Canadian Commission to Glasgow Exhibition went down to the fruit bazaar to get three specially good barrels of apples, good Canadian apples. He had the fruit of last year kept over in cold storage, and specially selected and specially sent over—I think Dr. Saunders looked after that—and it was admirable, in splendid condition when I saw it in June and July, but he sent down some time in October for three barrels of specially fine apples to bring up to the members and show them, and they said they got three of the best barrels that Thomas Russell could give them in the bazaar, and every barrel of them turned out to be filled with rubbish in the middle ! They got the names of the men who shipped them and the brand of the barrels. I am not publishing them here to-night. but there were three barrels picked on purpose to show to distinguished guests and to show that the Fruit Marks Act was enforced, and those marks were on those three barrels; very likely the only three that went out of Canada this year—(laughter)—so the terrible swing of the eternal came home, as retribution for wrong-doing comes on us. Those three special barrels just turned up opportunely. It was not much to brag about in the Glasgow Exhibition, especially when those old Scotchmen over there, who have a great regard for profits and honesty—especially honesty on the part of the other fellows—weighed out of the middle of those barrels certain quantities, and had them photographed and sent to me, with evidence that they weighed eleven apples to the pound. (Laughter.) It was not creditable. I tell you it has made me whistle small in Scotland about Canadian apples. People will

say that some few accidents will happen in a new country, but when these men rub these things into you when you are speaking of the expansion of Canadian trade it makes you wince. In sending fruit to the British market it is not wise to send many varieties at one time. I will not trouble you now with a list, but will put them in the report. They say, "Never send more than 12 or 15 varieties, and you will get more money." If a man will send 50 barrels of one well-known good variety, well packed, he will get 5 shillings a barrel more than he would get for 50 barrels of assorted fruits of any known variety, or all kinds mixed up. That would pay handsomely in one sense, and might be a loss in the other. We send too many varieties. This does not apply to pears, because often as good prices have been got for Keiffer pears as for any in their own season, and when the Keiffer pear is picked at the right time, and is dead ripe when it is eaten, it is not a bad sort of pear, no matter what people say about it—(hear, hear)—and I have seen some Keiffer pears this year that looked splendid on the skin as well as good to eat inside; and, at any rate, if an Englishman for any reason satisfies himself and wants to buy that pear for a good price I have no objection till he gets trained up. (Laughter.) I want to say a very few words about packing for the foreign market, and the picking Our people have not yet observed closely enough to pick out varieties at different stages of ripeness. Now if a man lets a Bartlett pear go as far on before he picks it as he must let a Keiffer pear go on before he picks it, the Bartlett cannot get to England by any device of transportation, and that direction about picking at the particular degree of ripeness needs to be observed. The same is true of apples. Then sorting and growing and packing are exceedingly important things to know. I will just emphasize two points now. We need skilled men to pack for safety in carriage. No matter how honest a man may be, if he does not know how to pack he will spoil tender fruit for safe carriage; so we require skilled men for safety of carriage and honesty, both for direction and action, for the sake of satisfying the consumer that he gets exactly what it is represented to be. Now those two things, which we should have over the whole country at large, would make more progress in one year than we have made in the last five in the apple industry, because at the threshold of commercial success, as far as I have scanned the growth of enterprise in this country and other lands ,lies this commandment, "Thou shalt deliver goods of the sort and quality that they are represented to be." (Hear, hear, and applause.) That is at the very threshold of all remarks. And the second commandment is like unto it, "Thou shalt deliver it in the best possible condition." A baker in Glasgow who grew very rich was once asked by a neighbor, "Geordie, how did you come to make so much money ?" to which he replied, "I never tried to make money; I just tried to make good bread, and the money made itself." (Applause.) It is getting on these fundamental principles and standing on them and living them out that means prosperity for Canada in regard to all its business, and particularly now in regard to this fruit export trade. Then what is the use of calling something by a name different from its own ? What gain is there in calling a barrel of poor apples "Extra Finest XXX" ? (Laughter.) Will it make them better ? Just for the sake of argument, for the sake of custom, we call them that. It is exceedingly faulty and poor policy to call a thing by another name than its own, the one that belongs to it and defines it and designates it. I think people sometimes forget the meaning of one great leader's advice. Abraham Lincoln was one of the great men. Once a great deputation came to him in times of trouble, and were very plausible, and made out a great case, and said a great many things that sounded well, but did not seem to be quite so. "Old Uncle Abe," as they called him with most reverential familiarity, said something like this, "Well, gentlemen, supposing a man should go to your place and begin to make you think that some things that you thought were not so were so, and they would say to you, "Now supposing, for the sake of argument, we will say that in the case of one of your cows that her tail is her legs. Then how many legs would your cow have ?" "Five." "Then, gentlemen, I have to say I am obliged to you for the kind information you have laid before me, and I shall consider it: and now go home and go to the cow stable and see if the cow has five legs."
charming way of saying that you might call a tail a leg, but it does not make it anything but a tail ? (Laughter.) So the branding of some barrels of apples "Extra Finest XXX"

leaves the apples inside just as they were. But it didn't leave the man who put the brand on quite as safe and solid as he was before. That is where the damage was left to threaten the country and its commerce. (Hear, hear.) Then the extent of the home market is quite large. We give the United States and their markets an opening for about $400,000 worth of fruit of the same sort that we grow at home. You can just meditate on that if you want to. We buy from the people of the United States, because of their business mainly, if you will, to the extent of $400,000 worth a year of the same sort of fruit that we grow at home. I do not include oranges and bananas and those sort of things at all, but $400,000 worth of fruit such as we grow at home, we allow them to supply for home consumption. At the same time we send to England about a million barrels a year, and England imports twice that many from other countries. So that if you want to get a bigger share of that market you will have to send rather better apples, not in quantity, but in regard to the contents of each package, and we will gradually win our way to as large a share of the English apple market as we have with other products. I will only say this about pears, that the markets of England in pears come to $1,300,000 a year, and we have grown from nothing in 1897 up to over $400,000 a year now, so we are making some progress in that respect. The transportation, of which I shall speak to-morrow, is the great point that seems to be discussed, but it is not the important point that means success ; but to show you how badly we get on in regard to the sale of our apple trade from packing and transportation let me just cite a few figures :— 14,000 barrels of apples on seventeen ships, 185 lots—a pretty large basis on which to build a conclusion—out of 14,416 barrels there were less than 6,000 barrels tight and in good condition in the market. The faults were : Slacks, slightly wets. wets, wets and slacks. Of the 14,000 barrels, nearly 3,000 were slacks, and they sold for 2s. 7d. a barrel less than other barrels in the same market at the same time. Then the slightly wets came to 3s. 8d a barrel less, nearly a dollar a barrel, and there were 2,500. Then of the wets there were nearly 2,000 that sold for 7s. 3d. (that is $1.75) a barrel less. Of the wets and slacks there were 1,250 barrels that sold for 9s. 11d., or nearly $2.50 a barrel less than the other apples of the same sort in the same lots that were landed in first-rate tight condition. Now that is a rather pitiful state of things; and that is a common occurrence in the auction sales at Liverpool, Glasgow and London, because I am giving you now the records of seventeen different ships and 185 lots. It was rather better this year because there had been an improvement in the cold storage, and a safer and better transportation on the ocean, which I shall discuss to-morrow. The relation of the Department to this, is a matter of some moment; but to show you something that is being done in this direction, just to give you, in a general way, a notion of the progress we are making, of ships leaving Montreal this summer, our Department officers examined and reported upon, carefully, not less than 204 sailings of ships from Montreal, not 204 different ships, but from the first of June 204 different sailings. Of those there were 96 sailings with good cold storage, that is, cold storage for butter and tender fruits; and then there were 12 sailings with the improved circulation of cold air at 45 to 50 deg. circulation in the chambers where cheese and apples were carried. and then there were 77 sailings where ships had the latest and best make of exhaust fans. This Association, ever since I came before it, has been urging on the steamships and Department to get exhaust fans for circulation, so this year 77 sailings had these of the best sort, and 96 sailings had improved cold storage of the best sort. Altogether, there were from Montreal no less than 340,000 cubic feet of space this last year. without counting one big ship that came into traffic with 200,000 feet. That is enough for all the cold storage accommodation for Canada.

J. F. Hanrahan: Can circulation be produced by the use of a fan in a chamber for the elimination of the odors and gases from the air ?

Prof. Robertson: Well, if you had a fan it would make the air move.

Mr. Hanrahan: That is not the question. I want to know if you can produce throughout the chamber a complete distribution of the air obtained by the use of a fan for the elimination of the odors, gases and moistures from the air, or the odors and gases generated from the product?

Prof. Robertson: Well, first of all, I do not know that there is any gain in eliminating the smell of apples from the chamber where apples are carried. I do not see any gain in eliminating that myself. I think it is rather a pleasant thing to be there. There is nothing harmful in the odors as far as I know.

Mr. Hanrahan: Nothing from the moisture?

Prof. Robertson: Oh, yes, that is another question. By the circulation of air the moisture is quite pumped out, and the chamber is thoroughly dry, and the cold storage chamber is so thoroughly dry that you can strike a match anywhere on the sides, and we have 450 cold storage buildings in Canada of the same sort.

Mr. Hanrahan: That is not true, because you have only mechanical cold storage on the ships to-day, that is, a series of pipes on the four walls of a chamber, and when extremes exist circulation cannot take place.

Prof. Robertson: I shall be most delighted to-morrow to discuss the whole question of cold storage, and to discuss the kind of cold storage we have on the steamships, because the last two years they had very good cold storage on the steamships, and they are sending also peaches and pears from California by our route in order to get them in England safely, and getting capital prices, so, without any apology to anybody, we have the best system of cold storage in the Canadian ships that is anywhere to-day afloat on the ocean. And we have what is still better. I was just going to say we have now this last season five steamships fitted with a special cooling plant to cool the air, and a special drying plant to dry the air, so as to pass that through to places where cheese and apples are carried; and we are now negotiating with them for that on seventeen more steamships. So we are a good way ahead of other countries in ordinary cold storage, and we are quite ahead in having this refrigerated air distributed through these chambers. Now the only other thing I have to say in regard to the English market is this: The Department has four men always on the other side who are all the while watching the discharge of ships from Canada. The Department has these to depend on for its information. In Montreal we have three men whose business it is to report on the putting of goods on board the ship, and if anything is wrong to see to it at once; and in the last two years we have made such progress that the people of other countries are going to get our plan and to ask these disinterested agents to give them information. These four men have been giving us the most valuable information in regard to apples, and sometimes the apples will get in the hold beside the boiler. That happened once this year, but I will venture to say that it will never happen again with that line of ships, because if that is published with the rebuke of the Department, shippers will never use that ship line again; and now they promise that at both ends we will have the service that we have been seeking in all these years. We are making progress by making efforts in every quarter, by getting comprehension of the methods, and then by co-operation all pulling together. I would like to take the full session of this Convention to-morrow forenoon, because I came this time particularly on purpose to correct a great many misapprehensions that have been sedulously published over Ontario regarding the effect of cold storage in the steamships, and to-morrow I want to put documentary evidence before this meeting to show the character of that campaign and the character of the cold storage we have, and that it is abundantly satisfactory, and that if it is not satisfactory the Department has said to me: "Go and get a better; and we will do that next year"; but I am unwilling to stay longer connected with this Association and its work unless I say to-morrow some plain things regarding the whole campaign of the last two years about cold storage in Ontario and on the steamships from Canada; and so I would like that you would have to-morrow a full attendance, and then I will answer my friend all about the elimination of gases and all other noxious things.

FINANCIAL STATEMENT.

The Secretary-Treasurer read his report for 1900-1 as follows:—

Receipts.		Expenditures.	
Balance on hand Dec. 1, 1900.	$ 281 17	Canadian Horticulturist	$2,592 43
Membership fees	4,634 25	Salary Secretary-Editor	1,200 00
Government grant	1,800 00	Commissions	750 55
Advertisements	301 45	Premiums	481 11
Samples, etc.	10 40	Illustrations	320 11
Binding and bound volumes	8 90	Annual meeting expenses	300 65
		Bookkeeper	240 00
		Reporting	188 40
		Postage and telephone	157 27
		Printing and stationery	118 80
		Affiliated societies	117 72
		Committees and delegations	95 20
		Express and freight	39 38
		Auditing	21 00
		Collection and interest	19 57
		Book binding	14 95
		Books	4 00
Total	$7,036 17	Total	$6,661 14
		Balance on hand	375 03

We, your Auditors, having carefully examined the books and vouchers of the Secretary-Treasurer, desire to report them correct.

A. H. Pettit.
George E. Fisher.

The President read the Finance Committee's report as follows:—

Grimsby, Nov. 25th, 1901.

The Finance Committee beg to report that we have carefully gone over the expenses of the year, and find them in accordance with the best interests of the Association, and we desire to express our appreciation of the highly satisfactory manner in which the books and accounts have been kept. We are also pleased to note that there is a reduction in the expenditures of the year.

W. M. Orr.
W. Pettit.
A. M. Smith

Colonel Rogers moved that the report be accepted and confirmed.

Mr. Huggard seconded the motion.

A. H. Pettit: I have to state, on behalf of the auditors, that we have examined the books and vouchers of the treasurer and found them to be perfectly correct in every respect.

E. D. Smith: Would it not be as well to place the members in closer touch with the Association by having the financial statement printed and distributed? There are so many items that on hearing it read one cannot criticize it intelligently. Of course we have faith in the Finance Committee, but it seems to me it would be more satisfactory if the members could look more carefully into it, and possibly some of them might suggest some changes for the new year. I would move that at the future meetings a copy of the financial statement be placed in the hands of the members before the matter is brought up to be voted upon.

The motion for the adoption of the report was carried.

Mr. Smith's motion was seconded by Mr. Tweddle and carried.

PRESIDENT'S ADDRESS.

By W. M. Orr, Fruitland.

The following address, which was read by the President, also constitutes the report of the Directors and Executive Committee.

This year has been one of special progress for our Association. Notwithstanding the increased expenditure in some directions, we have a good balance in hand, which reflects credit upon the management of our affairs. The continued increase of our membership shows that our work is appreciated on every side, and that our friends are yearly increasing in number.

Our journal, the Canadian Horticulturist, is a prominent feature of our work, and, therefore, we will call attention to it first. During the year we have kept it up to the 48 page limit, which in previous years we were not always able to do. Its circulation among horticultural experts, as well as among farmers, is gratifying, showing that it has a high standing among horticultural journals. We have made free use of photographs during the year in illustration, and have arranged to use a colored plate in the January number, 1902, and occasionally thereafter. The editor is making special efforts to increase its efficiency and circulation.

We are gratified to find not only horticultural societies taking the journal for their whole membership, but we have also inquiries from Farmers' Institutes inquiring on what terms they may have the journal for their members, and offering to pay 25 per cent. on each subscription, providing we could make a reduction of a similar amount. We have replied favorably to this, making the provision that these subscribers could not expect the premium plant, and we hope soon to make a proposal which will meet with the approval of all our Farmers' Institutes, and bring thousands of farmers in touch with us, so that they may have the full benefit of our publications.

The annual report of our Asosciation is now placed not only in the hands of our own members, but also in the hands of every member of the Farmers' Institutes. About 35,000 copies are printed.

We have also begun to take advantage of the prize lists of our Fall Fairs, and in some cases have offered one year's subscription as a prize. This has been accepted so gratefully that we propose to you the advisability of offering this to all the Fall Fairs in 1902. It would help very much to advertise our work.

Throughout the year we have been printing about 5,600 copies of the journal.

The interest of our local horticultural societies has been well kept up during the year. Although the lecturers are no longer sent out directly by our executive, yet Mr. Creelman, who has the work in charge, is desirous of working in close touch with us, and has sent the lecturers to talk over matters with us, so that in their visits to a locality they may work in harmony with us. It is true many of these societies primarily consider floral topics, yet they are equally interested in the fruit garden, and, wisely conducted, they will prove the greatest source of strength to our work. Through the efforts of Mr. Thos. Beall, our organizing director, these societies are constantly increasing in number.

Our finances, as you will see by the report, are in a good and satisfactory condition. Our growing work has neecssitated a little more expense in office work than formerly, but not more than was rendered necessary by the increase in our work.

The plant distribution last spring was larger than usual, and cost the Association $480.33, or about $50 less than the year previous. This, as you will see, is only about 10 cents for each member, a most reasonable amount when we consider the size and quality of the plants sent out. We have usually ordered these plants from Messrs. Stone & Wellington, because they offer us the best terms ; and certainly, during the last few years, we have had very little complaint over the premiums. We sent out in all 3,399 plants of the Spirea Anthony Waterer, and 4,018 plants of Cumberland raspberry.

It is with a feeling of pardonable pride that we refer to the magnificent display

of Ontario fruits at the Pan-American Exposition at Buffalo during the past season. The extent and excellence of our display was a surprise to our American cousins, and a source of gratification and pride (patriotic pride, of course) to every Canadian who visited the horticultural building.

The exhibit of apples of the crop of 1900 demonstrated the great possibilities of preserving fruits in cold storage from year to year in perfect condition, proving that, in years of heavy crops the fruit need not be sacrificed nor wasted, as it was in 1896.

Ontario has made a splendid record, and one that has made an impression upon the American people. We captured for fruits 19 gold medals, or one-sixth of the total number awarded; 33 silver medals, or about one-sixth; 35 bronze medals, or about one-fourteenth; 85 honourable mentions, or about one-fifth.

Of the gold medals, eleven were to the Province of Ontario for collections, and eight to individual exhibitors. The judges placed Ontario's fruit exhibit first in quality, and second only to New York in variety and quality.

All of which, I submit, is exceedingly gratifying to the people of Ontario, and reflects great credit upon Superintendent Mr. Bunting's ability as an organizer and manager.

In the competition for the Wilder medals offered by the American Pomological Society, whose membership covers the whole of America, we captured three out of fourteen silver medals, and one bronze out of eight. There were no gold medals offered. Every entry made from the Province of Ontario scored.

Transportation is a subject of vital importance to the fruit growers of Ontario. When the shipping charges on a consignment of fruit amounts to more than the value of the fruit, as is frequently the case, it is time to investigate, and I would suggest that this Association should consider the advisability of passing a resolution asking the Dominion Government to appoint a Railway Commission, to whom all questions of transportation and freight rates could be referred for adjustment.

We wish to express our appreciation of the horticultural work done at the Dominion Experimental Farm at Ottawa, at the Ontario Agricultural Farm, Guelph ,and at the thirteen Fruit Stations throughout the Province. We would also suggest that this Association should consider the question of approaching the Dominion and Provincial Governments with the request that an Experimental Fruit Farm be established somewhere in the fruit belt, where not only the testing of new varieties should be carried on, but the originating of varieties especially suited to our climate and markets. Such work is highly important, and, as far as I am aware, is not being carried on systematically or extensively in the Province. The production of a single desirable variety of superior shipping quality would outweigh the cost of many years of such work.

The San Jose scale, the most insidious enemy the fruit-grower has to contend with, is still a sourse of alarm, and continues to spread and do its work of destruction in infested districts. We realize more than ever the serious danger from this insect, and that, if it is not controlled, successful and profitable fruit-growing will be impossible. In this connection, a deputation has already waited upon the Minister of Agriculture for the Province, asking to have the Noxious Insect Act so amended as to allow municipalities to appoint inspectors, whose duty it would be to examine all orchards, and endeavour, if possible to prevent the spread of the infestation. It is proposed that, as this is for the public good, the Government should bear two-thirds of the expense and the municipality one-third.

The question of bandaging of trees for the destruction of the larvae of the codling moth, and the experience of the Township of Saltfleet, where the law has been enforced for two years, will be dealt with by Mr. Joseph Tweedle of Fruitland, a resident of the Township.

We regret that the cold storage for fruits during transportation cannot be safely relied upon by Canadian shippers. Although fruit prices were good in Canada this season, several growers, anxious to see the work of establishing our fruits upon the British markets continued, sent at their own risk consignments of pears. A serious loss was the result. Owing to the failure of the apple crop, fruit was scarce this season, and

the need of an outlet was not felt as it has been heretofore; but large orchards of pears have been planted within the last few years, looking to this market, and we fear that in seasons of a heavy apple crop the results will be disastrous to the pear grower unless this export trade is cultivated. No expense should be spared to perfect the cold storage and transportation system as quickly as possible, as experimental shipments of American Bartletts are being sent to Britain under the auspices of the United States Government, with the object to capturing this trade for themselves.

We would like to see the work on the "Fruits of Ontario" undertaken by our Secretary pushed to completion, so that we may have at hand a concise and comprehensive work on this subject for reference.

Although there was an abundance of fruit buds and bloom on apple trees last spring, the cold wet weather at the blossoming period prevented the fruit from setting properly, so that the apple crop was all but a failure.

Other fruits yielded abundantly, and prices were very satisfactory. The prospects for next year are all that could be desired, the trees and vines going into winter with a good growth of well-matured wood and an abundance of fruit buds in excellent condition.

Mr. Smith: We ought to appreciate very highly the efforts made by the Directors of this Association for the advancement of the fruit-growing interest during the past year, and the efforts of the Secretary especially in the arduous work that he has in connection with this Association. However, the point I wish to speak about is the paper. Many very good fruit growers have spoken to me at different times, saying that we should have a paper more in touch with the market, in fact, a weekly paper rather than a monthly, which is of little use so far as the markets are concerned. Of course, the first objection will be that a weekly paper is beyond our means. In answer to that it might be said that a weekly paper might be gotten up on a cheaper system, so that although it came four times a month it would not cost very much more than the "Horticulturist." In other words, that the expense that is put into the cover of the "Horticulturist" and into the fine paper and general fancy get-up of the journal, which is of course a pride to the fruit growers, be spent in giving practical knowledge to the fruit growers. It may be said in answer to that that three-quarters of the members of this society are not practical fruit growers, and that the paper is published in their interest as well as the fruit growers. However, it seems to me that sooner or later somebody will see that there is a great field for a practical horticultural paper published weekly. I do not know of a single such paper published either in the State of New York, Michigan or Ontario, and in fact in the New England States. Here is the northern belt of the Continent, and I do not know of any horticultural paper that appeals to the practical growers such as The California Fruit Grower, a paper which is published weekly, and which is of great advantage and benefit to the California people, but is not of much benefit to us here as they deal in different fruits. Now what would be the position of this society supposing that some individual should see a field for such a fruit paper as a private enterprise, supplying the wants of this northern district? Would it not cut largely into the subscription list of the "Horticulturist"? It seems to me that that is a matter that we ought to take into consideration. It is the wish of every member, I am sure, to see the society prosper as much as possible, but it has always seemed to me that there was something lacking in the society, that it did not come closely enough in touch with the commercial fruit-growing of this country, which is of more importance than that of the amateur, and that this society has not done possibly what it might have done in the way of assisting commercial fruit growers in getting better markets and marketing their produce in general.

Mr. Whyte: There is a great deal of force in what Mr. Smith has said, but it seems to me that we could get at that with very little expense by issuing a bulletin, such as the commercial agencies, on a sheet weekly and sent out by our association. The expense would be very small.

Mr. Tweddle: The interest of the amateur and the commercial fruit grower are so different that it is very difficult to unite them in one paper and satisfy everyone. I have been ashamed of my own apples, that I had not a better grade to pack and ship, and it set me thinking, and I have determined to cut off half the tree and secure decent ones from the other half, and in every other way to secure a better quality of fruit if we don't get half as much. I am sick and tired of growing poor apples. One of the best sources of information to help us out of some of these difficulties is this Reading Course for Farmers by the Cornell University. I have been studying over these lessons a little, and I believe they are the best thing ever put out, and I would like to see a deputation wait upon the Minister of Agriculture asking to have these lessons issued from the Guelph College, no matter what it cost. The editor of the "Horticulturist" has been publishing some of these Cornell lessons. In some way or other we ought to get this information from our scientific men at Government expense to help us out in every direction, and I would like the President to have this matter brought up later.

C. C. James (Deputy Minister of Agriculture): Do you refer to the leaflets on Nature Study, or those on Apple Growing?

Mr. Tweddle: As far as a resolution from this society would be concerned I say let it be Horticulture Study. Let the Farmers' Institutes bring up a resolution asking for their line.

The Secretary: You will be interested in knowing that in the December number of the "Horticulturist" Prof. Hutt of Guelph has begun a series of articles entitled "First Lessons in Fruit Growing." This will be continued during the coming year, which will be along the line Mr. Tweddle has asked for.

C. C. James: The first trouble is, of course, to get the material of the right nature, and it is very difficult to get that material to publish. If we could get the right material I think the question of expense of publication would be a very small one indeed. But where are you going to get the men to write these things? There are only one or two in America who can do it, but even if we have to take it to the other side, I suppose we will have to do it. The next question is, after you have got it distributed to get the people to read it. (Hear, hear.) The amount of printed matter that is going out in this country is something enormous; I think we are making very rapid progress, and if you were to put together all the material that is being published it would make a very large volume, in fact, two or three large volumes. The trouble is to get it just into the hands of the right men. We have in this Province 175,000 farmers. Well, you must not expect too much in a year or two years. I think the farmers are reading a great deal more than they ever did before, and if this Fruit Growers' Association can in any way at all put in our hands the right kind of material to publish, there will be no trouble at all about its being published and distributed. It is just exactly the kind of material we are looking for, if you can only find the right men who can write that material. It is an easy enough matter to write a difficult, heavy, ponderous bulletin; almost any man engaged in the work can do that; but to write a very simple bulletin, just along the lines Mr. Tweddle has been talking about, is the most difficult thing in the world to do.

Mr. Tweddle: I am very glad to hear what the Deputy Minister has said. I would like to state that in connection with the Cornell lessons, they send along with each lessons a little examination on that lesson, and if these questions are not answered in some way, or an attempt made to answer them, and sent back to the Department, that individual name is struck off the mailing list, and you can thus sift out your men who are hungering for this kind of thing, and it need not cost the Province one-tenth the amount it would to distribute this matter to 10,000 of the men who would not look at it. The Americans are far ahead of us in that respect. I think it will not do to admit before Prof. VanDeman that we have not the men here that can write these bulletins. (Hear, hear.)

C. C. James: It is an easy enough thing for a man like Mr. Tweddle to read these things and practise them, but the man who is mostly in need of it is the diffi-

cult man to reach. The man with the most neglected orchard, who is injuring not only his own orchard, but his neighbors' around, the trouble is how to get hold of that man.

W. L. Smith (of the Farmers' Sum) : Mr. Tweddle is a good deal nearer right than Mr. James in this particular matter. There is no difficulty at all in getting people to read this matter. During the last two or three years I have been in the houses of a thousand farmers, and I have been amazed to find the hunger for information and the manner in which it was received. The publications of the Agricultural Department are read to a much greater extent that Mr. James is aware of, and it is largely to his credit because he is interested in the preparation of it. There is no doubt that if the matter were properly prepared the people would read it.

Mr. C. C. James : I cannot cast any reflection on our own men, because a good deal of this work at Cornell is being done by one of our own men, Prof. John Craig—(applause)—and the Americans are always shrewd enough to pick up as many of our men as they can lay their hands upon. You will find that in certain plans that are being considered now for next year a lot of this literature will be distributed. At the same time, notwithstanding all Mr. Tweddle and Mr. Smith have said, the great problem is to get hold of that man who is less inclined to read, how to stir him up. Can we get him out to a series of meetings ? If we could send men forcibly through this country to clean out probably two-thirds of the useless apple trees, do it by force, we would confer a great benefit not only on those farmers, but on the country at large. We cannot do this thing by force, it must be a gradual educational, persuasive movement, and the question is how best to begin this ? Shall we gather together the farmers in the various sections and try to arouse their enthusiasm by talks from practical, hard-headed fruit growers such as we have here to-day, and then follow it up by leaflets, or shall we largely depend on the circulation of the bulletins and reports ? To my mind it is largely a question of how best to begin.

Mr. Tweddle : Prof. Craig told me that there were from 15,000 to 20,000 farmers in New York State receiving these lessons under the State grant, and that the State appropriation was all used up, and you must remember that those names were struck off if the farmers failed to send back the examination with some attempt at answering the questions. I think that that surely brings it down to a condition that it would pay well; there need be no loss in the dissemination of the literature ; it would all be read, what is sent out. We used to get these bulletins free from New York State, but now we have to pay for them, as the appropriation ran out, and if you educate a few men who will read, the practical commercial orchardists, the state of their orchards in a few years will be a better educator to the careless man than anything else, and it will be right before his eyes where he cannot get out of seeing it, and the education will be driven into him. I think that would be a cheaper way than to pull him out to a meeting, for he might forget it before the time comes for pruning.

Eben James : The remarks of Mr. Tweddle are very good, but in the five years that the orchards are getting into shape the loss to the country will be very much. Now the Farmers' Institute meetings take place all winter. Could not this association recommend that the Government send a man to everyone of those Farmers' Institutes and take the matter up ?—because I am convinced that people would have time then to listen to the matter, who would not read papers. Thereby we may get some results. If we do not take some active steps in the next few years the country will lose by it.

Mr. Morris : I hold that the farmers and fruit-growers do not at present get from the Government really what is due them in the way of expenditures. At the present time there is only provision made at the Guelph College for one or two students from each county. Those students go there, and if they are bright young men they get their education, and they are picked up by some college in the States and taken over there as Professors, and sometimes go to foreign countries. I would like to see our Government extend that institution so that we could accommodate perhaps twenty from every county, and adopt means to get that twenty to attend, and

each of those students when they returned home would be a teacher to all his neighbors. In that way I think you could educate the people more thoroughly than by any paper. A young man from the neighbourhood where I live, went to Guelph and on his return set such an example to his neighbours that he was worth a great deal of money to everyone of them, but unfortunately he died, and those who succeeded him were not his equal.

George Robertson (St. Catharines): I suppose the reason that a great many farmers do not read bulletins is that half the bulletins that are published—I have reference to the bulletins on the other side of the line, because I get a great many of them—are not worth reading. As Milton said about preachers, preaching to congregations, "They are filled with wind and are not fed." The fruit growers read a few bulletins that are no good, and they judge all bulletins to be of the same stock. Some of them are all right and some of them are not. I have no fault to find with the bulletins published in Canada; they are just as good as the money makes them that is appropriated for the publication of them. I think we do not spend enough time or money in Canada to get men to give their full time and attention to certain lines of investigation. A man has to spend his full time in investigating one particular thing in order to get information.

Mr. Sherrington: I think that the move that was made by the Department last summer in the way of holding orchard meetings is going to be a greater means of disseminating knowledge to fruit growers and farmers than any other way that we have adopted in time past. We meet right in the orchard, the farmers attend more largely, and they are of the right class. They get an object lesson right there, they carry that, and remember it more clearly than they would by reading bulletins. I am a farmer myself as well as a fruit grower. I read bulletins, but is is impossible for a farmer to study with the head and do manual labour at the same time; but where he goes to these orchard meetings and gets an object lesson he will never forget it. Last summer we had one held at our place. Prof. Hutt was there. Before it was advertised a good many of the farmers said they were not going, and there would not be many there; but they could not resist the temptation, and 300 attended, and since that time many of them have told me it was the best institute meeting they ever attended. We got an object lesson on grafting and pruning, and they have been speaking about it all fall, and asking if we are going to have more such meetings. They have also asked why the Farmers' Institute men did not hold some summer meetings. We have weeds growing in the summer that we cannot identify, and we want to know how to eradicate them. At a summer meeting we could take up some of those weeds, and there would be somebody there to tell us how we could identify them and destroy them. These summer meetings should be held sometimes at a private creamery and another in a township hall, and so on, and thus we could reach the fruit growers and farmers and be able to take up different lines in that way quicker than we could by sending out so much literature. This work could also be done at the annual fairs, which are not in the least educative as conducted at the present time, simply because a farmer goes there and gets a prize if he can by hook or by crook, and gets his money and then goes away home, and there is nobody educated by it in the least.

C. C. James: I think you will appreciate at once the difficulties under which the Department with which I am connected has to labour. The first man wants a law enforced along certain lines; the next man wants our bulletins and publications very much increased: the next man wants the agricultural college work extended, and the next man wants summer institutes. You see the variety of people whom we have to satisfy, and at once the difficulties that confront us most become very apparent. How are we going to meet all these things? In connection with the last point I would like to say this: during the last two years the Farmers' Institute work has been very greatly extended, and we now have a series of special summer institutes. During the last two years we have organized special institute meetings in connection with the poultry work, and have begun special meetings for the women

on the farm. We had a few meetings last year for horticultural work at our fruit experiment stations, and we are carefully extending all these, and wherever we find that one line of work is proving successful the proposal is to extend it; and I simply want to say that you must not expect that all these lines can be developed at one time, because it means a very great increase of labour and in the demand for men. It is becoming a very great difficulty to get men who are suitable for this work, and that are acceptable to the farmers of this country. The farmers and fruit growers will not put up with institute workers to-day of the same nature that they would ten or twelve years ago. The men who go out to address these meetings have to be of a far higher nature—better men, better qualified for their work than they were ten or twelve years ago. Now this is a good sign of the times. Where are these men to be had? They are scarce. It is difficult to get a man who is a thoroughly practical man, a good speaker, and a man who knows not simply how to talk, but when to stop talking—(laughter)—and how to make his talking plain and acceptable. Talk is a good deal just like writing these bulletins. I would illustrate that by a little incident that I came across not a great while ago. One of the most learned men of England had put out a book, and at a banquet shortly afterwards he was complimented on it by a lady, who said, "Mr. So-and-so, I enjoyed your work very much, it was such easy reading." He replied, "Madam, easy reading is very hard writing." Easy, plain, instructive speaking at the same time is also very difficult. Now these men who are acceptable for that work are not very plentiful. They are being demanded by other departments and other Provinces, and they are being sent for by the other side. The fact that the United States sends over here for men to address Farmers' Institute meetings on the other side shows how scarce those men are; and if we cannot fill the field in all those particulars it is not altogether our fault; but the work is increasing so fast that the demand at present greatly exceeds the supply. I think you will find that a great improvement has been made in the last few years. I am quite free to admit that we are only beginning this work, and the work to be done in the future is ten times what has been done in the past, but there are great difficulties in the way and those of us who are concerned in the management of it are sometimes at our wits' end how to meet them; and if you have any practical suggestions how to meet them we will be only too glad to get them. If it is more literature you want I think there will be no difficulty in getting that. If it is more meetings you want, we will try to meet you. I will not promise we will develop the Agricultural College as Mr. Morris would like to see it. Is it not remarkable? A few years ago people were casting suspicious eyes on the Agricultural College, and at the work it was doing. Now, regardless of politics, people are saying that this work ought to be extended. The work has been extended. We put in accommodation this last year for fifty or sixty more students. every place is now filled, and the time has now come when we have to make special provision for horticulture. We have special courses in dairying that have been exceedingly successful. We have a special course, starting in January, for live stock judging, and four or five times the capacity has been taken up by old men, veterans in that work, and next month you will find a large number of mature men from all over the Province coming up to get instruction in connection with the work of live stock judging. The same way with poultry. Now, can it be worked out in connection with horticulture? If there is a field there and it can be filled it will not be long before we will have some special courses in horticulture also.

The Secretary moved, seconded by Joseph Tweddle, the following resolution:

"Resolved, this Association ask the Minister of Agriculture to enter upon the publication of a series of plain, practical bulletins on the first principles of fruit culture."

Prof. Van Deman: I might offer a suggestion that perhaps would be of a little help. We have in the United States Department of Agriculture a series of bulletins that are called "Farmers' Bulletins." We had a long discussion once in the Department Club—a club composed of the officials of the Department of Agriculture—

when we were first starting those bulletins, and we finally came down to that one word "Farmers' Bulletins," and I think it is about the best thing we could have devised. There are some who are afraid of this word "scientific." Now, there is no person in the world that is more useful to the country than the scientific man, and then he must be a truly scientific man, not a scientific fool like some people are—(laughter)—a good, ordinary, scientific man, and then he will be of good account; but the ordinary farmer, this man that you are trying to reach, and can hardly reach at all—is awfully wary of that word "scientific." I think I would eliminate that word. word.

Rev. Father Burke (Alberton, P.E.I.): We have had a great deal of trouble in bringing instruction to the farmers of Prince Edward Island. We had a number of trees and were not able to find out what fruit they bore, and those trees were said to have come down from Ontario from your nurserymen, who used us as a dumping ground. (Laughter.) So we thought it would be well for persons to go round and do missionary work as spoken of now. We have sometimes meetings where professors from Ottawa come down and do a great deal of good, but it is very hard to arouse public opinion, and sometimes we have to go beyond conciliatory measures and almost coerce the farmers to attend these meetings. I think if some inspectors who understood their duty would go about, and go even into the individual farmers' orchards, and show them what ought to be done, a great advance movement would be made than in almost any other way possible. I know some people who are very intelligent in other things, but are too much occupied in something else to bother about their orchard. They have some very good trees, and if these were attended to they might be able to get profits. They get bulletins and read them over without any practical result. They probably might listen to speeches in some way, but a man going into the orchard and pruning the trees for him and telling him what kind of trees he has and the results he could get would do grand work. In my own parish I have been obliged to take my coat off and put my overalls on for a day and cut whole cart-loads of limbs off trees and fix up an orchard, and then next year we we had that man without any trouble. Up here in Ontario I do not think you are troubled very much about resources, and you have the Federal Government behind you sometimes, and if you could carry out this personal inspection and then give the fruit-growers the bulletins and speeches and everything else you could get some result, and upon the superstructure you make that man such a man that he would be of use to the country. (Applause.)

C. C. James: In that connection allow me to say that we have in this Province about 7,000,000 or 8,000,000 bearing apple trees, and the same number of trees that are just about to come into bearing. I merely mention that to indicate the enormous extent of the industry, and to say that there are some very grave difficulties in the way of treating the work in that practical manner that Father Burke has referred to.

J. McKinnon (Grimsby): I think we should consider very seriously the suggestion made by my friend Mr. Smith. The Deputy Minister has stated that the demand for good men to go to the farmers' institutes exceeds the supply. Now, the general economic rule is that when the demand exceeds the supply, then the price of the supply goes up, in order that it may meet the demand. (Hear, hear.) I have known of capable men who have been asked by the Government to go out to these farmers' institutes and who have not found themselves able to do so because they could make for more attending to their own business. I think there is a difficulty among us farmers that we do not appreciate our own importance sufficiently; we have not a high enough idea of our own value. (Hear, hear.) I have spoken to the Minister of Agriculture myself on this subject, and he has stated that the difficulty is to get the members of the Legislature to understand that when a farm labourer can be had for a dollar a day a master farmer of sufficient prominence to instruct his fellow-farmers is worth more than $2 or $3 a day. They are very apt to say, "Why, he can get someone to do his work on his farm for a dollar a day, and he is clearing

a dollar a day by getting two dollars," forgetting altogether that a farmer has a little work to do with his brain as well as with his hands, and that you cannot get a hired man at $1 a day to manage the business of a farm as well as to do its work. There are farmers in the Legislature who are most anxious to keep down the expenses of the farmers' institute and every else pertaining to farmers throughout the Province; and I think the farmers ought to impress upon their brother farmers who are in the Legislature the importance of this work, the necessity of getting the very best men to do this work, and impress upon them the proper sense of the dignity of their calling, so that it may not be said that when a lawyer is fit to do the Government work in the Assizes he is worth from $20 to $100 a day, but a farmer who is fit to do the work for the Government all through the country, and to talk to the best farmers at the institutes, is only worth from $2 to $3 a day. There is one great difficulty in allowing a reasonable fee to the men who go out to the farmers' institutes; as soon as you make the remuneration something to be sought after, something worth having, just then you find all sorts of political pulls to get men who are incompetent appointed to these positions simply that they may get the money. (Hear, hear.) It is apt to be looked upon as a political perquisite, and the work is given, not to the man who can be the most use to his country and to his fellow-farmers. but to the man who has been the most use, or is expected to be the most use, to his political party. Now, I would rather see the fee to lecturers at farmers' institutes kept down to the beggarly $2 or $3 a day that it is now, than to have political heelers sent all around the country to bleed the country of its money for the sake of their health in the next election. But I think that our present Minister of Agriculture has been able so far to act impartially, and to appoint good men on both sides of politics; and if he is able to keep that up—if we can keep our Department of Agriculture and our Department of Education, those two great institutions in which all the people are concerned—out of politics, and if we can get the very best men appointed, then I would say that we can afford to increase our fees to these men to something near the amount that they are really worth to the country and to themselves at home. I hope Prof. James will impress this upon the Minister of Agriculture.

Prof. Robertson : May I offer one observation ? In the course of the discussion we have noticed that the various Provinces represented here are all seeking for the best sort of help at farmers' institutes. Now, I merely give this little bit of information to the Convention, that Mr. Hodson, who was formerly so successful as Superintendent of Farmers' Institutes in Ontario, now of our Department at Ottawa, has arranged, in co-operation with Mr. Creelman, his successor in this Province, and with the men who occupy similar places in other Provinces, to have an exchange of the best speakers between the Provinces, for the main purpose of giving these men better qualification and more ability to carry on their work well. One instance will suffice. I think not less than six of the most experienced and capable speakers at the institutes of Ontario are going this year to Nova Scotia, New Brunswick, Prince Edward Island, Manitoba and the Northwest Territories, and then our Department is also able to bring men from these Provinces to be in contact with the experienced men of Ontario, and thereby gain them a wider outlook and more extensive knowledge, and therefore carry back help to serve their Province better when they go back. That is a form of knowledge in which our Department is most happy to co-operate with the Provincial Governments, and from that class of work I look for great benefit, because sometimes a man will listen, not only with interest, but with willingness to be taught, which leads to better action, to a man from a distance more than to one from his own locality. It is not possible quickly to furnish a supply of capable speakers, even if you offer them any amout of money, because men who are capable instructors do not acquire experience in a week; it takes years to gather that, and then it takes months of training to make a man quite competent to give his own experience in such a way that every man can profit by it. (Applause.)

Prof. Van Deman : You know we have a little politics on our side of the line, and I think we have a good deal more to the square inch than you, but I do not see any trouble whatever in the United States with regard to politics in the farmers' in-

stitute. I have not in my mind a single case in which party politics has been any considerable factor in this matter, and I do not think that you have cause to be apprehensive on that score. As to the prices that farmers' institute workers receive, I think that $5 ought to be the minimum, and if I were an institute worker in Canada I should utterly refuse to go for anything less than $5, and I think any self-respecting farmers' institute worker should just come to that decision to absolutely refuse to talk for less than $5 a day and expenses. (Hear, hear.) Some men who are really first-class institute workers are cheap at $10 a day. Perhaps your politics here would not permit you to pay those prices, but you certainly ought to elevate the standard in that respect. The thing will work out all right in the end if you only get your ideas elevated. Why, there is not a business in the world that requires such good sense, such scientific information, such business ability, as farming. (Hear, hear.) Most anybody who has got a few dollars and a little bit of common sense—you don't have to have very much of that—can run a grocery or some little business of that sort; but when you come to deal with the great problem of the tillage of the soil, and the diseases of animals, and the breeding and the insect pests, and all that sort of thing, and the varieties to cultivate and under the different climatic conditions and all that, why, banking isn't anywhere beside it. I want to make this assertion here, that as a class the farmers—and I will include myself, down to the humblest man that tills the soil—there is not any set of business men that know as little about their business as we do, and the farming community needs education above all classes of industrial workers. It was just a few years ago that there was hardly any advanced farmer that knew what potash, phosphoric acid and nitrogen were—the three cornerstones of agriculture and horticulture—for horticulture is just a higher degree of agriculture—but it is not so now. Nearly every intelligent farmer knows what these things really mean, and we are getting education faster than we really think, and what we want to do is to get it faster and faster; and if the farmer is educated the whole body politic will be elevated along with him, for he is the basis of the whole country, the Government and everything else. Therefore, I think we ought to give the most earnest consideration to this fundamental thing, the instruction of a farmer in his business, and as he is the one who pays the taxes I think he certainly ought to have a first-class education. (Hear, hear, and applause.)

The resolution was put and carried.

FRUIT SHIPMENTS TO BRITAIN.

By J. W. Robertson, Commissioner of Agriculture, Ottawa.

I am to speak to you this morning on some provisions that have been made for the safe transportation of fruit from Canada to the markets of the United Kingdom. I would like to make some observations on what has been done so far, what results have been found there, what has been done, in order that we might see where we are at, both what further should be done and what further can be done in the near future, because sometimes things we think should be done are not commercially or economically practical at a certain stage of a business's development. Now, the United Kingdom, as I said last night, imports yearly large quantities of raw apples and raw pears; at least, the imports of other fruits that we can supply are quite inappreciable in volume or in value. The average imports of apples come to above six millions of dollars annually, of which we supply nearly one-third, the United States nearly one-third, and other countries the rest among them. Those other countries are Belgium, France, Portugal and Holland in the order named. Of pears, the United Kingdom imports about $1,300,000 worth, and of those France, on the average, supplies one-half. The supplies from Belgium fluctuate from 40 per cent. down to 10 per cent., according to the condition of the crop, and then the United States supplies

on the average 10 per cent. So far the Channel Islands, which are spoken of often as being a large source of supply, because much in evidence, supply only 2 per cent. of the total imports of pears; and we in Canada supply very little yet—from nothing in 1897, when our first cold storage experiment with pears was made, until we are now supplying something over $50,000 worth a year. So that that is at least a growing trade, not yet very large, but promises to be a great deal larger as time goes on. In considering first how to reach that market, one has to think of a great many things; not merely the conveniences for safe transportation—which includes the package, because that is the object of a package—but also the packing and the condition in which the fruit is packed; because no sort of provision for safe carriage will carry fruit safely that does not start in that condition that makes it possible to carry it safely You can understand that if a pear is quite ripe when it leaves the growers, it cannot land even in Montreal in a fit condition for market, because the retailer wants something with safety in his hands else he will not buy it. I have a good deal of information that I might offer, but I will not do it now, on what our three inspectors under the Fruit Marks Act have found in Montreal this year regarding the condition of apples at the port of Montreal. This I may say, because I believe the Fruit Marks Act is to be discussed by itself, that in not a few cases they have found lots of apples going forward in such a state at Montreal, before going on the ship at all, that they have reported that those apples then were in such a state they would not fetch the freight under any possible conditions of transportation, when they got to the other side—apples that were over ripe and even partially decayed in the barrels when leaving the port of Montreal. So that you see it is not always certain that the best sort of provision on a railway car or a ship will secure safe delivery of all fruit. All that can be demanded is that it shall secure safe delivery of fruit that is put up in such a condition as to give it a fair chance. I think that is all that commerce or the fruit growers will want. Transportation, then, involves transportation from the tree to the teeth of the eater. Of course, we cannot go all the way in what I am going to say this morning. Understand, transportation begins from the tree, and involves risks of apples lying about in the orchard in the sun, risks of them lying in the barrel, and risks of them being damaged in the warehouse before they get to the eater ; so that in dealing with this very well and correctly called perishable fruit product one must expect at least a certain percentage of loss between those two points even with the best system of transportation that can be devised. We cannot look for safe delivery of everything, and I would like the fruit growers to think that out for themselves—that with a perishable product it is quite beyond the probability or possibility in commerce to look for the safe delivery of everything. It is quite possible to deliver objects in splendid condition in the middle of Europe from Canada, and we have done it. We have sent peaches to the Paris Exposition and had them delivered there in superb condition, and there was no cold storage from the port in England to Paris. Still, that is not commerce; that was to advertise the country's climate and our resources. It was not commercially practicable to do that and sell peaches in Paris under those circumstances. You see, the possibility of doing a thing for a purpose is not always applicable to the commerce that must stand only so much expense, because the goods are only worth so much at the end. The need of care is unceasing from first to last. If anyone slacks up care in any part of the journey, then you have some defect. Human nature is a bit weak. People say that everybory is as lazy as he dares to be, including even railway men who look after cars, and stevedores who load ships, and engineers who run cold storage plants, and recipients on the other side ; but in our experience these men have not failed in the commercial part of our work. Then they need knowledge, ability, skill, honesty. The Department of Agriculture at Ottawa is not a Providence to provide these things, and I think you would not expect them to. I would like to repeat that—care, knowledge, ability, skill, honesty; there is no safety in transportation if any of these things are left out. The Department may provide conveniences and the provision, but the people must exercise those. I think that is a clear division and distribution of responsibility. I want to show you

that the Department has provided its part of the work and its part of the scheme most admirably, and then if anybody else has failed in his respects, I am not the judge between the two to say, "Thou art the man"; let the man himself take it to himself. So the relation of the Department to these fruits and its qualities for management is that there has to be provision made, and then the people have to use it. In regard to the provision made, first, for the carriage of ordinary fruits such as apples—not the tender early apples, which are of another class—ever since I remember the fruit growers have been agitating for what they call ventilation on the steamships. I think the very first fruit growers' meeting I attended I found ventilation on the steamships to be one of the burning, live questions. Ventilation, to the man who says it, may mean a good deal or may mean a very little. Ventilation usually implies bringing in of fresh air and the letting out of the other air, so-called foul air. Now air does not of its own volition move. It does not obey anybody's dictum except the dictum of the Almighty through His laws, no matter what a man may say. You cannot command light and there is light, but you can always command light if you open the window; it will come in. The Almighty carries out His laws unflinchingly without any variation. We could not have any progress in human knowledge otherwise. Then if you want to have even what is called ventilation in the place where the fruit is carried you must have some sort of circulation, which means merely going around. Now, you may have circulation through a chamber, or you may have circulation within a chamber. The two are not the same. If you want to keep a building cool you will never dream of having a circulation of warm air through the chamber to cool it down. You would not dream of making a circulation of any sort of warm air through a cold place to make it cold, and you would never think of having a circulation of damp air through a place to make it dry. Now, moist air in the summer time is always warm and moist. But do you know that an inspector who went over the cold storage buildings that were put up in some places in Canada from plans furnished by our Department in 1897, found that these builders had listened to the voice of the wise man and thought it was needful to get ventilation and circulation by cutting a shaft so as to bring the outside air in and freshen it up? And so we found some damp buildings and some mouldy buildings among the others; but wherever the plan of the Department was followed the inside has been cool and dry, because we did not let in the warm, moist air, but by the arrangement of the building and the placing of the cooling agent, whatever that was, we effected the circulation inside the chamber itself, but no circulation from the outside into the chamber. The question of cold storage at large for Canada is one that is hardly yet understood. You cannot get a people like us, widely separated, informed in a new movement quickly. I think we have made wonderful progress in Canada to get ordinary men to understand the meaning of a process like that in a new country, which for the common people is hardly five or six years old. So I make that plain, that circulation inside does not mean a circulation from the outside into the inside. Then just because these things were not looked after in the past and in the best way, I may repeat this morning what I said last night about some shipments in 1898, that taking the whole of the account sales for 185 lots of fruit delivered in the usual way through the port of Montreal in ships that did not have any ventilation or forced circulation—even as recent a date as that—that out of 14,416 barrels, comprising those 185 lots, only 5,528 were delivered in a high condition—a little over a third of them—and the rest were, in varying degrees, slack, slightly wet, wet, wet and slack, and the loss in value at the same time varied from 2s. 7d. a barrel down to 9s. 11d. a barrel less than the selling prices of the tight barrels of the same lot on the average, that is, nearly $2.25 less per barrel for the wet and slacks than for the tight that were delivered by the same ships. Now come the inspectors in Montreal, who give it as their testimony, after a year's observation, that a good deal of the slack fruit they saw results from the fruit being packed too tight—(hear, hear)—that the compression of fruit into the barrel and the bruising a part of it, making it too tight in the barrel, is the cause of landing it too slack. That is the

judgment of those three men who have watched barrels and barrels brought through this year. However, there are now plenty of ventilated chambers in the ships to prevent any damage occurring on the ship after the present year, so far as ventilation and circulation are concerned. Now, in dealing with apples first, it is needful that there should be circulation of cold air through the ship where apples are carried. One instance: In 1900, in examining a shipment of apples out of a car from the Province of Ontario, when the temperature at the car was somewhere about 50 degrees, the temperature inside the barrels of apples as they were delivered at the car in going on the ship, was 85, actual test. Now, you say, they were loaded in a cool time. Yes, but if you load apples at 85 degrees in a cool time and batten the hold down, then you have the apples warm and causing an increase of heat by their own ripening and partial decaying. Such apples were delivered in Glasgow in that case, with this report from our men: "Apples evidently picked too ripe and shipped in far too ripe a condition." I don't say they were picked too ripe, though. They were put in the ship too warm, and there was no way of cooling them, so there was a serious loss. Last year out of 204 sailings of ships reported on by our inspectors—and we have three men in Montreal who do nothing else than watch the loading of every steamship that leaves the port and report to our Department every week how th stuff is loaded, how it is handled, what the place that it is put in is like, and what provision is made for ventilation and circulation—out of those 204 sailings this year there were 96 that had efficient cold storage with no circulation from the outside but a circulation within the chamber itself, and the cooling of the chamber by means of independent pipes all round the sides and on the ceiling, because that is found to be the very best plan for butter and cheese of the grade which this product is put into cold storage. Then there were 77 sailings that had forced circulation by means of fans, that is, the electric or steam exhaust fan would suck the air out, and a provision for letting the cool air outside be sucked into the holds. Now, by having self-registering thermometers—we had many of those on the ships last year, not so many as we would like to have, for these thermographs have to be specially made in Paris, but we have now an extra supply—in some cases you would find where the forced circulation of air from the outside was carried on. a temperature fluctuating anywhere from 45 up to 70 degrees on different days, according to the temperature of the air above. If the warm air was sucked through it warmed up the place where the thermograph was; but in the places where we had a new product made in the ships—which consists of two parts, a refrigerating machine that cools brine inside the pipes in the chamber, and where air is sucked through that chamber, first is cooled and dried, then that air is taken through the holds where the cheese and apples are, and is sent around again and taken then into this cooling chamber, you get the circulation of air from where the apples and cheese are to a chamber that cools and dries it, not to the outside—there we got a temperature that varied so that the highest on one voyage was 48 degrees, and the lowest 39 degrees, the average being 43 degrees. That gave delivery of cheese and apples in very much better condition than we have ever got hitherto. We had that arranged for five steamers last year. It was a new thing. I tell you this, not in confidence or in public—it doesn't make any difference—that with all the writing and negotiation we could not get a single steamship line to consider the thing favourably. They said, "No, that is a new thing that will not succeed, and if you want the thing done you will have to pay the whole of the expense and then guarantee the steamship company against any loss for the space it occupies." That was the steamship owner's attitude. Well, when Mr. Fisher and myself were in England this last summer we had interviews with these steamship owners, and then by showing them the wonderful progress that Canada was making in this improved transportation, by showing them how their own ships were carrying more of this food stuff, we got two or three of them to put it on their ships, and so we were able to arrange for five ships last year, and we will have no trouble this year in arranging for 17 or 22 ships (hear, hear)—because the shipowners said, "If we deliver the stuff in good condition it will stand higher freight rates, because the freight rate

is a mere bagatelle in delivering the stuff in good condition." (Hear, hear.) That system of circulating the cool air in the ships was not exactly a new invention, it was merely a new application of what has been known to some of the best cold storage engineers for some years. And let me put in parentheses here that in our cold storage policy and systems we have not been jumping at conclusions with our eyes shut, making experiments with ignorant men with the public money, but we have invariably consulted the most eminent cold storage engineers on this continent and in Europe before making any experiment at all; and so, while the cold storage system in Canada is known to be a good one, it is not the produce of any one man's planning or conception, but the best cold storage engineers have been laid under tribute. Thy have come to us freely. I don't think we have paid them any fees; but I have gone to these men and said, "We think this is a good thing, what do you think of it?" We have consulted Mr. Bowman, who was trained in Germany and was recognized before he came to Canada as being the best engineer of the biggest cold storage concern in England, that is the London Engineering Company. Then I consulted the engineer of the British Cold Storage Company in Liverpool. I consulted the biggest importers in England, and went all through their places, and got from those men the most civil and courteous treatment on presenting my card as Commissioner from Canada, and had the advantage of consulting their books. Then I had the happiness of consulting J. E. Hall, who put the cold storage on all the Admiralty steamships and 150 steamships of other countries. So we have not gone into this thing blindly; we have not gone into it groping in the dark or believing that every nonsensical thing said about it could be possible or practicable, but we have gone into it in a businesslike way before spending any public money. That being so. I would like to speak a little about the cold storage itself for the tenderer fruit. I have said what we have been able to do for apples, and what we hope to do hereafter for apples in a still more effective way, that is by both fans for circulating the ordinary air and by cold storage, cooling the air and circulating that cool, drier air. Now in cold storage, either land or sea, for safe holding in a building or for safe carriage in a railway car, you need to get one condition implying two things. The first of these is a condition that implies a reasonably low temperature, and then a reasonably dry atmosphere; and when you have these two things you have everything that is ever possible or desirable to get in cold storage. There is nothing more desirable, as far as I know, nothing more practicable by any system of cold storage that I have seen anywhere on the surface of the earth. Now, in getting these two things there are certain principles of construction, and then certain principles of operation which have to be observed. These are as well known as are the natural laws regarding anything else. There are the means whereby you can insulate, that is, prevent the so-called condition of hot or cold air going through. There have been most exhaustive experiments in regard to the insulating ability of every sort of substance, from still air all through the range to metals which are called good conductors. For instance, suppose you take a piece of wood as long as that (pencil shown), you know that you can have that piece of wood burned down till quite near your finger without burning your finger. Wood is not a good conductor; but if you get a piece of iron as long as that and make one end hot you will begin to feel that iron is a good conductor. There are things that conduct heat easily and things that don't conduct heat well. Of all the non-conducting substances that are known the ordinary atmosphere is the best of all if you can hold it still. As it gets warm it rises, and as it becomes cold it begins to fall, and you get a circulation at once. You know the boys' spiral toy. When it is placed before the lamp the upward air runs the spiral, but if you could hold that air perfectly still it doesn't travel. So still air is the best non-conducting substance. That is why the best cold storage engineers come down to this, that if you can get any means of holding the air still, in air you have the best non-conducting substance. It doesn't cost anything. So the object is to get the means to hold the air still. At first it was thought sawdust was a good thing because sawdust would hold the air within its particles. Then mineral wool, cotton batting, anything that held the air still and

was a non-conductor. Then as far as using paper between the boards, so that the paper would not get torn, and then by closing the top and bottom, you can hold the air in a wall still. But we found that paper and boards used will do that. The whole object is to keep the air still, because the heat will not traverse through the air if the air is held still. If you break that space in four or five places by cross curves, and then break it up into compartments you have it all the more efficient. The only objection to sawdust in some buildings is that if sawdust becomes damp it gets mouldy, and gives rise to bad smells, so that you cannot get the bad influence of that out, whereas wood and paper, properly used, with sand in the bottom to keep the air from getting in or out, give rise to no bad smells, and are usually impervious to ferment. These principles of construction have been published as widely as possible. In my report of 1897 you will find pretty full drawings of all kinds of buildings, and pretty full statements of the principles, and one of the very first principles in regard to the inside of these things is that you have the insulation thorough; there should be circulation of air within the chamber, and never any admission of air from the outside. Now a little wrinkle to know about for cold storage of creameries will give you some idea of that. I saw in an English warehouse that where they had a door that was open quite often they had a very tight-fitting canvas cover nailed at the bottom with nails, and the man brushed by and the curtain took in the shape of his body and closed in behind him, and the warm air did not rush in and the cold air did not rush out. We have got those curtains on nearly all the buildings in Canada ; the only difference is that we have split it in two, and the man can get in, and after we made that improvement I gave it back to the same people that gave it to me in the first place, and they said, "That is an improvement ; we won't charge you anything for using it, because you have given us such an improvement." These methods and principles are now in use in over 600 buildings in Canada with success, and giving satisfaction. Someone in the audience last night, when I said 450, said that is not true. Now. that man, whoever he is, has no means of knowing whether my statement was true or not, because he has not inspected these, and I happen to have the reports of our Inspectors who have examined them, and I happen to have knowledge of the products carried in them, and I happen to have examined probably 100 of them myself, and I say to you that what I say is true to the very letter—that there are 600 of those buildings in successful operation in Canada to-day, and other countries have copied our methods and systems of cooling products for shipment to other countries. To come down to the question of cold storage for tender fruits, as provided by this Department for a specific purpose, there was a cold storage building put up in Grimsby in 1897. It was to be put up from plans I furnished, but it was not constructed according to the plans. I had the floor torn up in my own presence, and it was not insulated. I had boards torn off the sides near the ceiling, and it was not insulated. There was no paper in parts, and so cold storage in 1897 was not quite effective. But since these defects were discovered they were remedied in the fall of 1897, before the opening of the spring of 1898, and in 1898 and 1899 that building gave the utmost satisfaction in every single respect for cooling fruit quickly, and there was no bettter building on this continent, or any other to my knowledge, for cooling fruits quickly and keeping them cool. Now. it has been said quite frequently lately that that building at Grimsby was a failure ; that it was not well constructed ; it did not cool the fruit. and was a disgrace to the Department. But that building. after being improved when we learned of our failures in 1897, is the best cold storage building for cooling fruit that I have seen anywhere. and that is the verdict of fruit men who cooled the fruit. I will give you the proof. In 1900 and 1901 that building was under the care of a committee of shippers, not of our Department. In 1899 it was under the care of our Department, and gave the utmost satisfaction in cooling fruit. Other buildings have been put up since on the same pattern. As far as the building is concerned, I will not deal with it again. I will give you the results from the selling price of the fruit and the effect of the building on the fruit when I come to deal with sales. But after the fruit is cooled in a building it must be carried in a cold storage car to be carried safely, because if you take cool fruit out of

a cold building and put it into a car that lets it get warm you just shorten the life of the fruit and increase the risk of it being spoiled. A good many years ago the Department had submitted to it plans of a car called the Hanrahan cold storage car, and those plans showed that the car, if built according to them, would be in very many respects a most admirable and superior car. It had, I think, one or two points that were better than those of any car that I had ever examined, or any plans I had ever seen, and I had no hesitation in saying so to Mr. Hanrahan, who showed the plans and the model to Mr. Fisher and myself. However, shortly after that, when we approached the railway companies to build some cold storage cars of the best sort, I took those plans to Mr. Shaughnessy of the C. P. R., and to the man in a similar position in the Grand Trunk Railway in Montreal, and asked them to build some cars for the use of our Department according to those plans, and I had two interviews with the master car builders in both railways, going into the details of what we wanted so far as safe carriage was concerned, and both railway companies absolutely refused to build one car of that model or of that pattern. Their reasons were these :—"It may be a good car, from what you say, for safe carriage, but it is not a safe car for railway rolling stock from our point of view, because it has four doors, and the load of ice in the middle of the car, instead of over the ends where the wheels are." That was their objection. In the second place they said, "There are patents on it, and it costs us too much money ; we can have good cars without paying this." We have had no connection with that since, because the railways absolutely refused to accede to our earnest request to have these cars built for us for use on this traffic. They refused, and we said, "Well, we cannot force you." They gave us other cars, which in every respect are equally effective ; therefore there is no loss to the country as far as I see. In any cold storage car, however, there is need for constant care, because a car runs, and it moves and sways, and doors will become loose, doors will not fit so well after they are used as when quite new, and any man knows that in shipping grain or cattle or anything else, if the shipper does not exercise care in looking after his car there will be some defect in it. I am shipping now 1,200 cars a month, so I know something about the conditions of shipping. I have occasion sometimes to look after the condition of the cars, and I have many years ago shipped a very large quantity of cheese. That was my business, and so I happen to know the transportation part of it, or the business part reasonably well, and I found it necesssary to block the door of the car to save the product. Every man knows that he must use his common sense, else there will be loss. Now, so far as our Department managed the cold storage building at Grimsby, we had to arrange to keep the doors shut. They put old cars on that business. Sometimes the place where the water runs out is not properly trapped, and therefore the cold air streams all along the track, and cools that instead of cooling the car. We did not do anything except writing the railway company giving the number of the car and where it started from, and the agents all along the line got overhauled for doing that. We sent circulars to the railway agents all along the road in the spring telling them about the doors and the condition of the car. We are making satisfactory progress, though we are not perfect yet. We need constant care. Then the Minister has decided that he will appoint this year a travelling inspector of all cold storage cars, regardless of their arrival at Montreal, so as to keep the station masters still further instructed wherever a cold storage car is, that he will follow that cold storage car and say, "We want a better door; that trap is not closed," and keep an eye on the conductor of it, so that the man will know the meaning of it. I will give you an instance of want of knowledge and the effect of it. Last summer in Glasgow I looked at some butter out of a cold storage ship. The report of our men was that the butter was delivered in excellent condition, and the thermograph, or self-registering thermometer, showed a good record. In thirty-six hours after the steamer was discharged I found Canadian butter lying on the wharf, nearly melted a quarter of an inch in, a part of the consignment. The rest had gone straight to the cold storage warehouse because the men knew their business and looked after it. This other was a lot that was consigned, and I am told the man was hawking the samples around

trying to get a buyer before he took delivery, because then he would have to meet his bills. There were nearly 400 packages of Canadian creamery butter damaged down a quarter of an inch before the man in the retail shop got it, and we heard afterwards that that was Canadian creamery butter. So you may have the best conveniences possible, but you must have a man looking after the thing who is interested in the product. Then to come to the cold storage in the steamships for tender fruits. From 1897 onwards we have been having an increased volume of cold storage with mechanical refrigeration. I mentioned last night the extent of the capacity. It is quite large enough presently for the traffic that demands cold storage service. Take last year for tender fruit. None were carried, as far as our records show, with thermographs in the chambers, except to Glasgow. A good deal went that way, and the thermographs' records show that the highest average on any one voyage was 40 degrees, and between 38 and 40 is the temperature which growers of pears want to have them carried at. A few Canadian shippers like a temperature lower than 34 degrees. The average for the season was 37 degrees. I have the engineers' records, which were taken by myself twice or three times, and had compared with the thermographs' records, and in nearly every case the engineers' log agrees with the self-regulating device, which is locked, and which he cannot get at—which is, in my judgment, a confirmation of the conclusion that in our opinion the engineers have been trying to do their work faithfully on the ship. Now, I would like to take some results from these experiments, and if they have not been quite satisfactory—and sometimes they have not been—I would like to find out why, and where the cause of the failure has been. I want to deal first with tender apples shipped in cold storage. I need not detain you on that. It is enough to say that of the twenty odd shipments at different times made under the care of the Department in cold storage every single one was delivered in capital and faultless condition, with the exception of a few cases in one shipment. The only time that we had an unsatisfactory report on tender apples from our agent in Liverpool was in the case of some tender apples that were sent in the chamber put on the "Manchester Trader," and called the Hanrahan cold storage chamber, and our report that time was as follows:—"Re the shipment of early apples on the 'Manchester Trader,' this shipment had every chance, as far as the space was concerned, as it filled only about one-half of the space of the chamber in which it was carried, there being nothing else in that chamber." A cablegram of September 10th from our agent in Liverpool said : "Trader apples, one hundred half cases, have been sold by public auction here at 1s 6d to 3s 3d; quality, gone soft." That is the only case in our knowledge of tender fruits going in cold storage of which we have any report—over twenty shipments—where the report has been unsatisfactory in regard to quality and condition of apples.

The Secretary : Can you tell us the varieties that were shipped in the successful shipments ?

Prof. Robertson : The same as were sent from Grimsby—Astracans and Duchess, and those apples. Then the cablegram was followed by a letter of the same date, September 10th, of which the following is an extract :—"The 100 half cases of apples of Ontario Government consignment created much excitement at sale to-day, but prices were low, as large supplies of Morello grapes, etc., were offered. The apples looked well, but being early varieties had gone soft and melting, and were not good eating."

Mr. Caston : That is, they did not pick them soon enough.

Prof. Robertson : I want to repeat that of the varieties of apples shipped under the care of our Department, including twenty shipments, we had no such report as that, and there were no apples delivered in that condition, as far as our evidence could be obtained.

The Secretary : Have you lists of the varieties of the apples in those twenty shipments ?

Prof. Robertson : I have ; they were all sent from Grimsby, and I think most of the lists were furnished to us by yourself. Now I want to deal with the shipments of pears, and as I see it is 12 o'clock I promise you I will be through by half-past

twelve. It is needful for the status of our fruit in the English market, and elsewhere. I will say nothing about the shipments of 1897, the first year, because we were feeling our way then, and the building at Grimsby was not satisfactory, and many of the peaches and pears did not land in very good condition that year. But now I come to deal with the shipments of pears in the season of 1898, because I take it that tender apples and pears and other apples are what we want to send to England. I need not recite the details beyond saying this, that a quantity of pears were sent over in those trial shipments that year—only a few, 2,208 cases. They were estimated to hold about 26 or 28 pounds the half case. Now, take the whole lot. I need not give you the details, which have been published quite widely, and the conditions; but taking the whole shipment, I find that they realized at Grimsby, after all expenses were off, 73.6 cents a case. That was not a bad price considering it was a new trade, and there were promiscuously gathered up lots. I want to make just this one remark, that the difference in the lots of pears on the earlier shipments varied in the first shipment from a dollar a case down to 46 cents a case at Grimsby, transportation being the same. You see it is not all in transportation, because these pears had all the same transportation; at the same time, one lot netted over a dollar a case, and the other netted only 46 cents. Some went as high as $1.12 a case. I need not go into that at great length, but these are the results. Now, in the "Canadian Horticulturist," which, I understand, is published under the auspices of this Association, in June of the following year, when these facts were all quite widely and well known. I find this—an article signed by F. R. Latchford of Ottawa, in which he says regarding the temperatures necessary to be kept on shipboard for safe carriage:—"Such temperatures have been maintained in the shipments that have been recently made to England. The cold was produced by the most approved chemical processes. The temperature of the storage chamber was all that could be desired, but no application was made of the cold produced to rid the chamber of the moisture, gases, odors or heat produced by the goods carried. The result was necessarily a failure." This is an entirely incorrect statement. The result was not a failure, but was safe carriage for the pears, and the provision on the ship provided for the removal of the moisture and the heat—the only two things that can be removed, or should be removed, in carrying pears. Then let us come to the shipments of 1899, and I would like to show what they resulted in. In the shipments that year some packages were smaller, and the receivers in Liverpool reported that they contained from 16 to 18 pounds. Now, those pears again realized from 50 cents a package net at Grimsby to $1.54 at Grimsby. You see the difference was not in the car, nor in the ship, but in the fruit at the original starting point; and, although they were carried in the same car and on the same ship, and sold in the same market, the differences were as wide as that, from 50 cents to $1.54.

A Delegate: How do you explain that?

Prof. Robertson: In one case the fruit was well packed and not too ripe, and in another case it may have looked reasonably well, but it was altogether too ripe, and landed dozy, going in the same car and the same ship. The point I want to make quite clear is that the safety is in the condition in which the fruit starts, because some fruit was carried safely all the time, and if it started well I think it has always gone well. Then take the reports in full, which have been published for nearly two years, and which I will send for the asking, that those pears that year realized 83 cents a case and a fraction over the whole of the pear shipments net at Grimsby after all the expenses were off, in spite of these low ones; and we have the most convincing reports from the receivers and the dealers that the pears were landed in capital condition, except the few lots that were over-ripe. Now, that being so, I want to refer to the "Canadian Horticulturist" again, which is the organ of this Association. On page 192 of this issue of May, after this thing is given to the public quite fully and freely, there is an article, evidently an editorial, and it says this:—"Just one thing is lacking, and that granted, the fruit growers of the Province would begin exporting these fruits at their own risk, viz., the guarantee of safe carriage within certain limits of temperature." Then it goes on to say at the very close:—"But the difficulty is to get the tem-

perature guaranteed on shipboard, or, if guaranteed, to be honestly kept." You see, all the while throwing doubt and a little bit of suspicion on the ship's management, when the records are and the evidence is that when the fruit went on the ship well it was delivered well, and the end of the business was that a man, when he put good fruit up, and ready to start in good condition, gave this provision that was made for it at the other end a fair chance. I want to supplement that statement with the proof. Say the shipments of 1899 were all right. The Department did not only guarantee in writing that the temperatures would be kept, but it saw that they were, and has the evidence that they were kept on the ships at the proper temperature. Now I come to the shipments of 1900, and those shipments were not made under the auspices of our Department at Ottawa. The cold storage building at Grimsby was freely turned over to the Committee of Fruit Shippers for themselves to manage. Our Department, however, arranged, as far as practicable, to get space on the ships, with cold storage, to carry the goods safely. Now, after the season's work in December, 1900, there was a long article on successful export shipments of tender fruits in the "Canadian Horticulturist." I want to point out a few statements of this article, so that we will not be going on a false basis or assumption regarding what we need for the fruit trade. After saying how the provision was made, and what provision was made, and who it was made by, it says the first shipment by the "Manchester Trader" was chiefly of Red Astracans and Duchess apples, and was forwarded on the 25th August ,and it goes on to give other details. "They arrived in Manchester in fine condition, which proved how complete a success Hanrahan's system of refrigeration is, for the Astracaan ripens, in ordinary conditions, a few days after it is picked." That is the statement about the only shipment of tender apples of which our reports speak as being landed in an unsatisfactory condition. Then on the next page appears this statement :—"However, we had the satisfaction of knowing our fruit reached the market in the very best condition, and of establishing a reputation for our fruit that will be worth millions to our fruit growers in the immediate future." That is what it says about that shipment, and referring to some others, and then goes on to say the second shipment was made by the steamer "Commerce," leaving Montreal September 15th, just in the nick of time for Bartlett pears, but too early for Crawford peaches, and goes on to speak of the excellent condition in which the shipment ex "Manchester Commerce" was delivered ; and the steamship "Manchester Commerce" was one of the steamships fitted up by our Department the same as it has been for years, and delivered the fruit from these people in splendid condition, and there is not even the insertion of an explanatory paragraph. And now I need not make any further report of that in the meantime. Then, further, there is a report in this also which is an evident intention to report the results of cold storage shipments in tender fruits, that there was a third shipment sent forward on the "Manchester Trader." That was a specially fitted steamer, not fitted by our Department, and this third shipment was sent at a later time when all the conditions were more favorable in cold weather and all the rest of it, for safe carriage ; and the report on the shipment ex "Manchester Trader" published here from the people who received that fruit is this :—"We have now the pleasure to report on the shipment ex 'Manchester Trader' of grapes, pears, apples and peaches. The latter were nearly all spoiled, and we should say that they were packed too ripe, and besides this we see the Wilson cases are not ventilated at all. Kindly examine, and you will see that this is correct. It must have a serious effect upon the fruit." The report from the agent in Liverpool—not our agent—on the grapes carried then says :—"The grapes, speaking generally, were in very good condition. An occasional sample was slightly wet or mouldy, but on the whole they looked attractive and sound." Then further on it gives further reports as to the condition of that shipment, which show that that shipment was not delivered in good condition. That was the shipment in cool weather. It is rather glossed over. The date of sailing from Montreal was October 5th. In the meantime there had gone from the same people on a steamship fitted up by the Department of Agriculture at Ottawa—and had been the same for years—a shipment of pears and other things, and our agent, in a letter dated October 12th, says that :—"Some

of the pears arrived ex 'Manchester Commerce' are in prime condition to-day—twelve days out of cold storage. I have kept them in a warm room, so the conditions have been quite as trying as if they had been in a retail shop." The report from our agent in Liverpool regarding those pears carried in the "Manchester Trader" was as follows :—"Our grapes"—that is, the grapes carried in the "Manchester Trader" not in cold storage—"our grapes were in far better condition than Potter's"—out of the Hanrahan cold storage—"which were carried in the Ontario Government chamber. All I saw were wet. Peaches mostly rotten. Bartlett pears and Flemish Beauty altogether rotted, and the whole consignment was not landed in as good condition as the fruit that came ex 'Manchester Commerce' in the cheapest refrigerating chamber." Now, that being so, rather gives me the impression, as well as the information, that there must be something not quite sound and fair in making the reports as to the results of cold storage shipments. Now, another shipment was made in the Manchester ship City—that was a chamber fitted by our Department, and here again, from our report, the fruit was landed in good condition and sold at good prices. The third shipment by the Trader sailed as late as November 18th, when the weather was certainly cool enough to give every sort of safe transportation. I have not seen the report of the fourth shipment yet, but I am told that the report was so unsatisfactory that the shippers wanted to be refunded by somebody for their loss on it, a thing we have never heard of nor did in any part of our experience in any cold storage shipments when the weather was as cool as it is in the month of November. Now I come to shipments made in this current year, which were not of very much volume, and were made by shippers at Grimsby on their own behalf, and they were carried to Montreal in a car provided by themselves, and put in the cars provided with cold storage, and went into the steamships provided with cold storage. They went on the steamer "Lakonia" on September 12th. I find in the "Canadian Horticulturist" for November an article which is headed in large type, "Ocean Cold Storage Not Yet a Success," with smaller capitals underneath, "Bartletts Either Cooked or Frozen," and then the article goes on to say that some shippers at Grimsby are very much dissatisfied with the returns from the pears shipped on that steamship, the article leaving the impression that the whole failure and all the fault was with the cold storage on the ocean. It says :—"A few of us at Grimsby, anxious that the experiment so well undertaken should be continued, forwarded at our own risk to Glasgow from Montreal on the 12th September, per Donaldson Line, 1,120 cases of Bartlett pears, green and hard, and in a condition which we believed would carry them on deck in the open air in safety. Our surprise was great to have the report from Thos. Russell of Glasgow, the consignee, dated 28th September, to say that the whole shipment landed in bad condition, and over-ripe, and had to be sold at from 2s to 5s a case, and a good many cases were worthless, and that some lots would barely pay the freight. While our shipment was kept at too high a temperature on shipboard while lying at Montreal, and for the first three days out, after which it was at last got down to 40, we notice that the first experimental shipment of Bartletts from the United States Government was injured by too low a temperature, and some of the fruit was frozen." I will give you the facts about that shipment. The proceeds now show that some of that fruit netted 58 cents a case at Grimsby, although it struck a very bad market on account of dullness, and some of the same fruit, in the same car, and in the same shipment, in the same market, netted 1¾ cents at Grimsby. That may mean something. I want to tell you further why I know so much about this fruit, and why I am saying all these things ; to get at the trouble as to why there has been a lot of publication that the cold storage on the ocean is not a success—it has damaged the country and made the people of England say, "Why, we will not pay a good price for your pears if your own people and your own journal say that your cold storage on ships is not a success." Now you can quite understand that you can make a shipment of pears in cold storage, and some of it is wretchedly bad—I use the word advisedly—and then the rest would not sell as well. Could a man expect to get 58c net at Grimsby when the other fruit was wretchedly bad ? One shipper at Grimsby—I will not give you the name—accidentally opened a case and telegraphed me on September 10th, "Much

fruit shipped last night, Glasgow, under marked size, slackly packed, culls. By all means inspect Montreal on arrival." And so, as my duty called me, I sent three official inspectors to Montreal to examine that fruit before it went on board the ship, and I sent a copy of the report of those inspectors to each shipper, and so the writer of that article was informed about what the inspector said about the fruit that had left Montreal. Other fruit went on the same ship. Before I speak of that I want to state what the inspector said of that fruit. I will give you specimens of just some cases. "One case marked 2¼, 3 in 10 small." That is the inspector's official report to me. I did not see this one. "One of those scabby, being 3 in 10, not as marked. A No. 1, 2½, 2 in 10, slightly under size, 2 in 10 deformed, one of those over-ripe, being 4 in 10 not up to grade as marked." Then a good deal of the fruit was sent 1¾, and small at that. Then some cases were sent to Ottawa for examination next morning, and after examination there by competent men, not interested, one case had 60 specimens then over-ripe, and the reason why they did not bring a big price is blamed on the ocean transportation, and published in the official journal of this Association. I took pains then to find what was happening, and so I found that some other men shipped pears on the same ship. Well, I thought if their pears were also landed badly we must try to correct it somewhere ; but Messrs. Hart & Tuckwell, large shippers in Montreal, who shipped pears quite extensively, finding the business profitable, said :—"At your request we give you the report of the pears we shipped on the Lakonia to Glasgow on September 12th last. The peaches were fairly ripe when shipped. The pears were in good condition. The market was in bad shape owing to heavy receipts in Glasgow of Scotch and English pears. We have no complaints to make over the cold storage facilities of the steamer." Then I wrote to others. John Barrie & Sons said :—"We shipped on September 12th, per S. S. Lakonia, to Glasgow, in cold storage, 300 boxes California peaches"—and more are coming our way, because they have, they say, the best and safest transportation they can get on the ocean"—and 212 cases California plums, which arrived at destination in excellent condition." So you see that article saying that the cold storage was not a success, but was a failure, was an article that had no basis in fact, and was an article that had no business to be put in your journal, in my judgment. Then I want to say one thing more about this particular shipment, to show you that this cold storage in this particular case was just as it has been always. Some of those pears shipped by Hart & Tuckwell were sold in Glasgow, all of them in fact, at an average of 5s 3d a half case, which netted over 90c at Montreal. They were very well satisfied. It was a very capital price. And then, later on, a shipment was sent on another steamer, The Marina, and the same two shippers from Grimsby whose fruit was so disastrously losing to themselves evidently on the first shipment, realized on the second shipment, from the information I have, respectively 27 and 26 cents per case at Grimsby, whereas other shippers there realized a fair price; the first time realized out of the same shipment on the same ship respectively 70 to 77 cents per case, so that it is not the transportation, or it would affect everybody. Then the third shipment, which was again under similar conditions for transportation—I have not got the actual account sales yet—but the whole account sales for one of the large shippers netted 93 cents a case at Grimsby after all expenses were off. Now that is, to my mind, rather complete evidence that, so far as the cold storage on the ship is concerned, the cause of failure and loss has not been there ; and this evident desire to campaign in favor of something against the truth does not stand, and we are not going to have it stand—(hear, hear)—because truth is just, and must prevail. Whatever action you desire to take I do not mind. I only want to make that statement by the authority and instruction of my Department before this convention of this Association, because these statements have been going broadcast in your journal, and the statements are incorrect and misleading, and should not have been published. Now I have nothing further to say on that beyond this : that lest somebody should say I have made a mistake—because you do run risks of making mistakes ; if you do not yourself your men do—I had four cases of that fruit retained by my instructions, under my authority, under the Fruit Marks Act, and I had those cases of fruit frozen

solid then, and those cases, at least two of them, are available for examination by a committee of this Association if they want to examine them to this day. (Hear, hear.) And lest there might be some misunderstanding again, I had a basket of that fruit taken from those cases sent to Ottawa for inspection sent to the meeting of the Privy Council, then in session, because they were responsible for the money that I was the means of spending. I said there is nothing that makes one believe like seeing, and I sent a large sample of that fruit as it came from those cases over to the Minister of Agriculture in session. Of course I do not know what was inside those doors, but the fruit went in, so I think that some people who have been responsible for this know at least what that fruit was like, that fruit which was the means of saying our ocean cold storage was not a success, so justly and fairly described in the telegram of one of the shippers, in which he said that the fruit was under marked size, was slackly packed, and culls. That is as accurate a description as I could give of the fruit I saw. I want to give you one instance before sitting down. I have not claimed all that has been done by this system of cold storage, because we have sent, as I mentioned in passing, pears and peaches and tender fruits all the way round to Paris in safe condition in this exhibition work; but the whole record of our commercial work is that the fruit has been carried in safe condition, that our Department shipments in 1898 and 1899 were uniformly profitable in pears. Peaches and tomatoes are doubtful always, because they do not keep. This year the cold storage of the same sort was used to carry fruit over to the Glasgow Exhibition, and I am told that one of the men brought back specimens of the fruit from the Glasgow Exhibition, and they are in a fair state of preservation. They may be evidence of some progress. We want to have more yet, and we want to have some improvements now, and we have been making substantial progress and making real improvements in the judgment of competent and able men; and I think it necessary to say these things to get behind and get below all these things that are not correct, and that are not giving our country and our Association a chance to do its best, and getting at the facts. I will be very glad to take part in the discussion, and to prove down to the hilt everything I have said in this matter.

Mr. Hanrahan: Just one question before Prof. Robertson leaves the floor. As he is going to be a leading authority in handling the fruit products, and as he has condemned the Hanrahan system, will he state what is wrong with the Hanrahan system that gives such results in accordance with such reports as he has already given to the meeting?

Prof. Robertson: I have not said a syllable in condemnation of what is called the Hanrahan system. I have read the report and the results.

MR. WOOLVERTON'S REPLY.

The Secretary: I shall not take up very much time, as I have not come prepared to enter into a discussion of this kind; but I would just like to say with regard to the statements that have been made in the "Canadian Horticulturist" that I have been actuated solely by a desire to forward the interest of the fruit growers of Ontario, and if any of these statements are inaccurate they will be corrected where so proven. I do not know that anyone present at the convention has a deeper personal interest than I have, or has more at stake in this matter than I have myself, or is more anxious for this work to go forward to a successful issue than I am. The omission to mention in the "Horticulturist" that the steamer Commerce, on which our second cold storage shipment was made in 1900, was fitted out under Prof. Robertson's instructions, has already been corrected in that journal; but the statements which we have heard to-day regarding the condition at Liverpool of the Astrachan apples carried by "The Trader," in the cold storage chamber fitted by Mr. Hanrahan which left Montreal August 25th, 1900, are quite different from the statements concerning those same apples made by Mr. Peter Byrne, the Ontario Government agent at Liverpool, who was present at the unloading: they are also quite different from the statements of our consignees, who reported that "the fruit could not have been carried better, the new arrangement of the brine pipes being a splendid improvement."

The comparative failure of our last shipment by the Trader, sailing from Montreal November 18th, 1900, is not due to any fault in Hanrahan's construction of the cold storage chamber ; it was due to the fact, which has already been fully explained, that these pears were frozen at Montreal in transferring them from the car to the boat, of which the following statement in a letter from B. W. Potter & Co., the consignees, is in evidence :—"Manchester, 8th December, 1900. Sir,—The Trader has arrived, and we hasten to inform you of the condition of the fruit sent by her. We understand that whilst she was loading there were seventeen degrees of frost, and, from the engineer's report, that it took six days for the chamber to reach 39 deg. Fahr., no brine being pumped in the meantime, we judge that the fruit had been pretty well frozen. The result is that the pears rapidly rotted ; almost immediately they were discharged they went off in color, and we fear it will be difficult to dispose of them at anything like a price."

Regarding the statements in the "Canadian Horticulturist" of 1901, criticizing unfavorably the cold storage of the steamer Lakonia, these will be duly corrected if proven inaccurate, but when two of us who made up a large portion of the consignment lost about $250 each it led to making stronger statements than perhaps are wholly justifiable. Now I want to give you a few words in regard to the shipments this year. There have been forwarded four different trial shipments of pears during the season. The first was by the "Lakonia" of the Donaldson Line, for Glasgow, to which reference has been made this morning, which sailed from Montreal September 13, consisting of 1,120 cases of Bartlett pears. These left Grimsby on the 9th in a refrigerator car, and at that time they were very firm and green. After they arrived in England we had a letter from the consignee saying :—"We regret to inform you that they landed in a bad condition and over-ripe." I have here a summary of the net proceeds, which I will not take up your time to read. They range all the way from 1c a case to 50c a case net proceeds. There is a letter from Thomas Russell, the consignee, to say :—"I do not think I could add anything to my last letter regarding these pears, and you will see for yourself from account sales how they sold. A heavy percentage were in bad condition, and I think they had been too cold in the refrigerator. I have to inform you that your consignment by the S.S. Marina has arrived in better condition, and yesterday we sold the majority of these at 3s a case, and a few up to 5s per case." These reports were very unsatisfactory, and led us to inquire where the blame rested for these goods arriving in bad condition. Letters from the steamship company showing that it was not until three days after leaving port that the temperature was got down to 40 degrees led us to blame the cold storage on shipboard. Prof. Robertson's letters, with the reports of the inspectors, would seem to cast blame on the packers for putting up fruit that was over-ripe. The small size of some of the fruit that was shipped, which have been designated "culls," the shippers explain by their desire to test Bartletts two inches in diameter in the Glasgow market, and the returns show that it was worth trying, for nine cases of the two-inch Bartletts that arrived firm sold in Glasgow for $1.20 per half bushel case ! The chief difficulty, therefore, was with the over-ripe condition on arrival.

Prof. Robertson : May I inquire were any smaller than two-inch sent ?

The Secretary : There were a few sent less than two-inch. I think we could perhaps get at the sales of those also. I claim that it was a proper experiment for a shipper who was largely interested in Bartlett pears to try what the result would be to ship a Bartlett that was presentable that was of a small size, so long as the package was of that character and sold for that size, because, in his opinion, it might be that they would bring a satisfactory return, and we want to find that out as an experiment. No doubt the work of the inspectors in Montreal was as thorough as could be in the little time allowed them, which was a few hours while the load was being transferred from car to boat. It is to be supposed that they chose such packages as seemed slack for examination. There was one lot of cases which were made of lumber too thin to hold the fruit properly without the middle partition. But these formed a small part of the whole consignment. In order to arrive at the truth of the matter as to where the

fault lay we have secured the testimony of the shippers—some of whom are here to speak for themselves—some of the packers, and the men who superintended the cold storage at Grimsby. This is from one of the packers of my own part of the consignment—there are other gentlemen present who can speak for their shipments :—

"This certifies that I packed the Bartlett pears for L. Woolverton that were shipped from Grimsby on the 9th September for the S.S. Lakonia, and that they were very green and firm when they left the packing house. As to size, I did not use the grader, but had a sizer on the table, and tested every specimen that looked doubtful. (Signed) A. Plain."

Of course this is as much as most people would be prepared to do in making up shipments unless they had a grader, which costs anywhere from $10 to $30 or $40—to have a cardboard with holes in it before them by which they could test any specimen that looked doubtful. Then another certificate from the manager of my fruit farm :—"This certifies that I gathered the Bartlett pears for Mr. L. Woolverton for packing for S.S. Lakonia, and that they were, in my opinion, almost too green and hard, being scarcely full grown ; that I nailed up the packages when filled, and that they for the most part were tightly packed, except one lot of cases which were made of very thin lumber, sawed three to the inch. Those sawed two to the inch were all right, and held the fruit firm. I also superintended the cold storage at Grimsby for this lot of fruit, and had it kept as near to 40 degrees as I could with ice until the Monday that we loaded the car, when, owing to the large quantity stored, including 500 cases from one shipper, the temperature rose to about 50 degrees. I also saw some of the packages opened that day, and they were still green and hard. I also examined the ice boxes on the two cars into which we loaded them, and they were well supplied with ice. They were ordinary G. T. R. refrigerators. P. Blanchard, Foreman." I have here the list of the shippers who shipped in that car, who are most of them present, and will probably give you their testimony in regard to the condition of these pears when they left their packing houses.

This is from one of the shippers who is not present :—"This certifies that I personally superintended the packing of my Bartlett pears for the steamer Lakonia of September 12th ; that they left Grimsby in a condition as green and hard as it is possible to ship them and expect them to ripen; that the sizes were 2¼ and 2½ inches in diameter, and that my net returns for the 47 cases was only 62 cents, or about 1½ cents a case, and that I am quite discouraged over the whole business. E. J. Woolverton."

This is from another shipper, who is present :—"This certifies that the Bartlett pears which I packed and shipped by the steamer Lakonia left Grimsby in a perfectly green and hard condition. A. H. Pettit."

In order to trace the matter a little farther, we wrote to the Robert Redford Company concerning particulars of temperature at sea, and received this reply :—"October 18. We have yours of the 8th, and have gone carefully into the temperature of the steamer Lakonia, and find that after the fruit was loaded the temperature gradually declined until the third day out, when it reached 40 degrees"—what was I to infer ?—"It did not not rise above that figure until the pears were finally discharged at Glasgow." Surely here is a weak point in the link if they are three days after leaving port before the temperature can be brought down to 40 degrees.

The inspectors speak of finding many small pears in this lot ; too small to give us profitable returns. Now, so far as these account for our small net proceeds, we quite understand the circumstances, and are prepared for the results—indeed we purposely tried small ones so as to see what the results would be. Our net returns from the Marina, sailing from Montreal September 20th, were mostly satisfactory. I have a list of those here. The third shipment consisted of Duchess, Anjou, Clairgeau and other hardy varieties, and left on the Kastalia October 3rd ; the return was a net average of nearly $1 per case. The carload of Keiffers sent forward by one of our shippers who is here present, was made up entirely of his own fruit. Mr. Murray Pettit of Winona

This variety is a good shipper, and will stand much more abuse than the Bartlett. This shipment arrived in Glasgow in excellent condition, and Mr. Pettit can tell us whether the returns were satisfactory. This is all I have to say on the subject. I only hope that Prof. Robertson and everybody present will at least give me credit for trying to do the right thing in the interest of fruit growers, and not accuse me of having any hidden purpose in view in any statements I have made. I think anyone who feels very much disappointed and hurt over certain results feels like saying, maybe, more than he would say if he did not feel just that way. I thank you for the time occupied. (Applause.)

Prof. Robertson: May I supplement what Mr. Woolverton has said to some extent? I merely want to give any information I have that will help to a clear understanding of this. There are three shipments, one of the Lakonia, and on the Marina, and on the Kastalia. There is no question but that a part of the fruit on the first shipment landed in first-rate condition of fitness; the evidence is that a part of it was in a first-rate condition when it started. All of the next shipment was evidently put in in good condition, and arrived in good condition, so that the cold storage system on the three shipments is exactly alike. The engineer's report of the temperature is the same within one degree.

The Secretary: But the second shipment was three days out before it was reduced to 40 degrees. Now, there should be one day in port while these goods were being loaded (hot weather), and if the temperature was up to the temperature outside it might be 70 degrees or 80 degrees. There would be four days in which Bartlett pears would be exposed to a high temperature. Surely this would be enough to ripen them unduly and cause the loss.

A. H. Pettit: I would like to ask Mr. Robertson a question in regard to the cold storage on board the steamship. Is there a possibility that the boxes of fruit on the outside of the compartment, near the pipes, might be frozen, while those in the centre part of the compartment near the thermographs might have possibly the exact temperature required? Is there a possibility of one gentleman's fruit going through all right and another's all wrong in the same compartment in the same steamship?

Prof. Robertson: I do not think so, for this reason: If the fruit were stacked in a solid block, then the air coming in contact with the brine pipes and coming out cold might be, so as to chill or freeze those close up, and leave the whole of the heart still warm; but all the fruit was stored with quite a space between the rows, so as to permit of circulation, and our agents—who did not know anything about this at all, and who made me a report in the usual form when the ship landed in Glasgow— say that from the appearance of the package and the appearance of the chamber the fruit was in excellent condition. This is Mr. Oak's report back from Glasgow on the official form. I will say this, also, that it is not usual, and hardly safe, to bring down tender fruit from, say 50 degrees or 55 degrees to 40 degrees, all at once. The safety and the benefit comes in bringing it down gradually. Now the steamship record shows that the fruit was at 54 degrees when the chamber was closed, which was not a very high temperature; that next day it was 44 degrees, the next day it was 42 degrees, and the next day 40 degrees. Now, anyone who understands cold storage will see the desirability of bringing it gradually down that way, rather than jumping it all at once from 54 degrees down to 38 degrees, and after it was kept at 38 degrees, 39 degrees, 39 degrees, and was at 39 degrees when the chamber was opened for discharge; and other records are like that. I think so far as the ship is concerned that there was no damage and no injury there; still I will get all the information I can on those points.

E. D. Smith: Would you state a little about the method of cold storage on those ships? Are the pipes all round the chamber, as we have been told, and overhead?

Prof. Robertson: Yes. I am not sure whether there are pipes overhead in this particular ship—that is, I do not recall this particular ship myself. I will tell you how these chambers are cooled, especially the ones where fruit is carried. There are brine pipes around at least three sides of the chamber. Suppose this is the ship (illustrating), very often you have a hatchway in the middle like that. Well, there may be a division

across there and there ; that is the shape of the cold storage chamber, that "L" thing. In that case the pipes are around these two long sides, no pipes around here ; then in front of the pipes there is a little space and one lining of lumber that comes within six inches of the top, so that the warm air will go in there and be cooled and dried by the pipes and go down here again. The fruit is packed in such a way that between the rows there are 4-inch bars, which provide room for circulation all through the fruits. In some ships they have the cold storage pipes on the ceiling also, because the butter men and meat men want it that way. Wherever it is possible we have cut off the ceiling pipes, but in any case there is no chance of the ceiling pipes freezing fruit, because that is the warm part of the chamber, if there is any warm part at all. The reason we cut off the ceiling pipes is this : that sometimes when the chamber is open, when the fruit is being loaded, the water will condense on those pipes and drop off and wet the top layers, and that is the reason we have sometimes covered them.

E. D. Smith: Do you think you can get a good circulation of air through the chamber with the pipes on three sides of it as you could, with the pipes on one side only ?

Prof. Robertson : Quite, if you face your pipes in such a way as to get your opening near the bottom. With that, even if you got the pipes on all four sides, I think you could get a better circulation still. You get it from the centre both ways, and the big chambers they have for the carrying of meat from New York have the pipes on four sides, and the ceiling as well, where they carry the meats at a uniform temperature of 29 degrees.

A. M. Smith : Do you get the circulation there with the pipes on the ceiling ?

Prof. Robertson : Not so well, but in carrying meats the circulation would be so sluggish that they put more pipes on top and let the cold air fall right down, and that helps to make the circulation in the centre.

Prof. Van Deman : In the United States this matter of cold storage is being thoroughly investigated by our Government authorities, and I happened to be down at the Washington cold storage about two weeks ago, and in conversation with the Superintendent there I learned something connected with the experiments being made now by the Department of Agriculture that is quite new to me, and this is the point that I wish to offer here. This Superintendent informed me that they were making careful experiments to determine how long it took packages of fruit to change from the temperature in which they were put into the compartments to the temperature of air in these compartments, and he said that the self-registering thermometers in the centre of an apple barrel had shown conclusively that it sometimes took as long as a week for a barrel of apples to cool through to the centre. If that is the case it might cut quite a figure in some of those experiments that you are perhaps wondering about. It is no wonder that some fruits might perhaps ripen up faster than we think they would.

The President : Do you know what the temperature was in the compartment ?

Prof. Van Deman : I don't know, but they have varying temperatures down as low as 30 degrees.

Mr. Caston : That is assuming that the barrel is closed tight ?

Prof. Van Deman : Yes.

Prof. Robertson : In the case of those shipments, however, the packages were quite small and quite open, so that there was a good chance for them to be cooled quite quickly. First as to the quality of the air in which pears and things of that sort may be kept. There are things that decay from the surface, and therefore the quality of air has some influence on their decay ; as you all know, pears that are spoilt, spoil from the core, where the air that surrounds them never comes at all, so there is a question of getting a low enough temperature to stop the natural ripening of the fruit. Now, at just what point that is stopped in some varieties of fruit, I think nobody yet knows. I rose to say this—which throws some light, in my own mind, on many of our difficulties—we have all believed, in fact we have known, that, say, the curing of cheese and the ripening of fruit were a good deal alike, by caseins that are inherent in the substance, apart from the rennet at all. Now it has been proved that the casein of milk, which is

an unorganized ferment, will carry on the curing of cheese away beyond the point at which any of us thought it would act, because it has been held generally that if you get cheese down below 36 degrees it stays quite unchanged; but this year I saw cheese that was put down to 18 degrees the day after it was made, and frozen solid and kept for several months, and was cured at that temperature, the casein acting slowly, but acting to cure the cheese at a temperature of 18 degrees. That makes it more evident that we are only at the beginning of knowing how to keep fruit, especially tender pears, and if they got a little too ripe at all the temperature of 36 degrees would not stop it, whereas if you get the fruit a little less ripe, where that ripening agent is not active, then you can keep your fruit. I have kept pears for three months myself. It is a question of getting at the degree of ripeness, which none of us has the evidence of. At any rate I am quite sure that as far as the temperature of the ship is concerned 36 to 42 will carry the pears quite safely. It has done that, and a few degrees more or less does not make very much difference, but a great deal depends on the state of ripeness of the fruit; and our fruit inspectors will tell you that a great deal of that fruit at Montreal was fit to eat then, and actually was rotten in Montreal. I will call these men to the stand if you want them. And at Ottawa I had rotten pears, not merely ripe, but rotten, and I ate three of them that were quite as juicy and ripe as they could possibly be.

The Secretary: We could not possibly pick them greener.

Prof. Robertson: I am sorry it is impossible to pick them greener.

D. J. McKinnon: It is necessary not only that the fruit should be carried at the proper temperature on the steamer, and that it should be picked at the proper ripeness, but that it should remain at the proper temperature between the picking and going on board the steamer. Now, I happen to know something about this shipment in question from Grimsby. I know that the temperature in the cold storage warehouse was sometimes over 50 degrees, and up, I think, to 55 degrees before the pears were put on board the car. I know that for some reason or other the cold storage warehouse was not at all in good condition for storing the fruit. I need not go into the reasons why that was so, but it was so, and I think all of us from Grimsby know that it was so. I think it is quite possible, and I believe it is true—the gentlemen who have made these statements are above suspicion—that these pears were picked in good condition, and that they were spoiled between the unloading from the farmers' waggons at the storehouse and their arrival in Montreal. Now, again at Montreal, they were put on board the boat at a temperature of 54 degrees. If they had left Grimsby in good order they should not have been at a higher temperature than 40 degrees. If the car was a good one, and kept well iced, the temperature should not have been allowed to go above 40 degrees on board the car. If there was proper care taken by the transportation company in unloading from the car to the boat, then the temperature should not have been allowed to go much below 40 in the process of loading and unloading. How was it that the temperature in that compartment was 54 at the beginning? Something must have been wrong. Either the compartment in the boat was not at a low enough temperature, or the fruit was at too high a temperature when it entered the boat. I have been told—I do not know whether it is correct or not—that the apparatus for refrigeration on board the vessel is not always in good working order when the vessel is in port; that the engines are sometimes started some considerable time after the loading of the fruit on board the boat. I just mention this as a question. I do not know the truth of it, but if it is so, can it be remedied or can it not? Now, these boxes in which the fruit is packed are 5-inch boxes, with good wide cracks both at the top and at the bottom, so that there is abundant opportunity for the cold air to get in there very quickly, and I do think that in less than three days, if the refrigeration apparatus on the steamship is strong enough, the temperature might be got down so that in the heart of one of those boxes it would be as low as 40 degrees in that time. It is entirely different from a barrel of apples closed up in a so much larger package. These boxes were so open. I wish to speak of the shipment late in the season in the Hanrahan car in 1900, I think it was. It was stated that, although these pears were shipped in November, yet they arrived in very poor condition, although the weather was cool enough, so that they

should have carried on the deck in excellent condition to England without any refrigeration, although pears picked at the same time, from the same trees, were kept, without any attempt at cooling, in the ordinary temperature in my barn for a number of weeks. Now here is the trouble. I know as a fact that the temperature on that Hanrahan car was above 60 degrees—if I remember the figures, 66 degrees—the day before it left Grimsby, and it had been about 60 degrees for some considerable time. The fault was not in the car ; the fault was that there was not any ice in the car, or that there was so little that it was impossible for any car made by Hanrahan or any other man to keep the fruit at a proper temperature. That fruit was spoiled before it left Grimsby. Is it any wonder that it arrived in bad condition on the other side ? I do not blame the Hanrahan car, I think it is all right, and I do not blame the Hanrahan compartment on the steamer. I suppose it is as good as any other and not a bit better. I have never been able to see that the Hanrahan has any virtues above any other good system. The Hanrahan car is better built than the most of the old cars that come our way ; it is a new car ; it is a grand car, and I would rather put my fruit in it than in any other of those that come our way, but that is because it is new and well constructed, and not because of anything in the system that is better than any other system. Other systems permit circulation just as well as the Hanrahan system, to my mind, so that I think if we would get right to the bottom of these things a great deal of trouble lies, as the Professor said this morning, between the top of the tree and the consumers' teeth, and not on board the steamship altogether, although I do think that at that one point between the G.T.R. car and three days out we should not have such a rise in temperature as we are told of, if everything has been right up to the arrival of the car in Montreal. I do not see why the temperature should ever get above 45 on board the steamship, and it should be down to 40, I think, within 24 hours; and in one of the thermograph records that I saw, unless my memory fails me, the temperature did get down to 40 degrees within twenty-four hours after the time it got out. There are a great many of these little things that we have to examine most minutely, and that we have to be careful of, we shippers, just as well as the steamship companies, and the unfortunate thing is that one little mistake made at the beginning or in the middle will destroy all the carefulness that we exercise all the rest of the way through. (Applause.)

E. D. Smith : I see that you have me down for a paper to-morrow on exactly this same subject, and I would suggest that I make a few remarks now, and not have the paper to-morrow. I did not come prepared with a paper. I saw that Professor Robertson was on the programme for this address, and I supposed a discussion would follow that would cover the ground. This is one of the most important subjects that we can discuss—the transportation of our surplus products to British markets, or to other markets for that matter, for it is just about as difficult for us to land some of our fruits in good condition in the Northwest as it is in Britain. The subject is divided, as Professor Robertson has well stated, into two departments : that of the apples which go without cold storage, and that of those perishable products which require cold storage. Taking up the subjects in the order that Professor Robertson did with regard to the shipment of apples, most of the gentlemen in this Association will agree, I am sure, with the Professor when he states that they have been urging on the Government for years to do something in regard to exhausting the warm air or pumping in cold air into the holds of vessels carrying apples across the Atlantic. The statements read last night and this afternoon by the Professor with regard to the loss and damage on shipments of apples, I am sorry to say, will continue in some places. This year from the port of Halifax—from which, I understand, there have been none of those ships sailing that have been fitted up—there are just as bad results as there were four years ago. I am delighted to hear from the Professor that the Department has carried into effect what they proposed to do last winter, that is to test this refrigerator plant in one compartment of the vessel, turning cool air into the other compartments where the apples are stored. The only criticism that I ever felt like making to that project was that it might be a little difficult to get the steamships to take this matter up on account of the

cost, and Professor Robertson has stated that that is the case. We have always believed that it was only necessary that the hold of the vessel in which the apples were stored should be at the same temperature as outside the vessel. We know that at the season of the year when we ship the apples the temperature on the ocean is at least cool. From the data gathered this season, as stated by Professor Robertson, sometimes it appears it has been as high as 77 degrees. I am a little surprised at that, and imagine that that temperature must have been very seldom, and possibly in the St. Lawrence before the ships got into the ocean.

A Delegate : It might have been crossing the Gulf stream.

Mr. Smith : I should not think it would have been as high as 77 degrees even crossing the Gulf stream, and he says as low as 44 degrees. I should like to know what the average or general temperature would be. I should imagine it would not be more than 55 degrees or 60 degrees. In such a temperature we who handle apples know that apples will keep a long time. We know that these same apples lying under the orchard in barrels, exposed to sun, at a temperature often up to 85 degrees and 90 degrees in the day, at night down to the freezing point, subject to the exposure from rains and all sorts of variation in the temperature ; these apples lie there on the ground in barrels for a month without being soundly packed, whereas shipped on the vessels according to the methods in the past, one-half or two-thirds of them are damaged to the extent to lose 50c. or 75c. a barrel at least on their value. This is being remedied by the exhaust fans. I would like very much to have had data presented by the Professor to show the condition the apples arrived in from these vessels, and compare it with the condition in which they arrived under the old system. I am sure every grower of apples in this country must feel grateful that the Government has taken this matter up, and has made a good start at any rate, and others of us hope that before another season passes by a sufficient number of vessels will be so fitted to carry all the product from the farms of Canada. I remember that last winter in the House of Commons there was some objection taken on the part of some of our Nova Scotia friends that the grievance was chiefly from Ontario, and they insinuated rather roundly that it was the fault of our apples. Well, I hold in my hand a return from some of the steamships sailing from the port of Halifax this season, and just to corroborate what has been going on here before I will state that in the steamer Evangeline, which sailed for Liverpool October 28th with 1,460 barrels, the report was as follows :—"Tight, 1,202; slack, 220 ; slack and wet, 38; and the report said that almost half the barrels arrived in a wretched condition, and sold from 50c to $1 a barrel less than others. The Grecian had 875 barrels tight, 189 slack, 68 slack and wet ; so more than 20 per cent. of the cargo arrived in hat wretched condition. From the port of Montreal I have very little data, as I was not doing business from that port, but I have heard a statement of one carload that went on the Lake Ontario—I do not know whether that was one of the vessels that was fitted up—and there were 141 tight, 24 slack, and 23 slack and wet, so about one-third of the cargo was in bad condition. The Persian, that sailed from Montreal, had 779 tight, 477 slack, 24 wet and 18 slack and wet—not nearly so bad as those from the port of Halifax, but bad enough. This loss has been going on from year to year. I believe half a million dollars a year has been lost to the farmers of Ontario directly, besides the indirect loss, which is something beyond computation, because we heard from Mr. James about the bad condition of some of the orchards of Ontario that were neglected, and a great many of the trees that had to be rooted up. Well, what is the reason ? Why is it that the farmers are not caring for their orchards ? Merely because they have not been able to make them pay under the treatment that they gave them. If these farmers had been getting 50c. a barrel more for their apples during the last ten years than they did get I believe the farmers would have been delighted, and would have thought it was a good investment to spend some money on their orchards, but in the last two years they only got 40c a barrel for their apples, and they quit taking care of their orchards. Not only that, but these men who become discouraged cease planting. Now I think our exhibits at Buffalo, and in the last twenty years, show that if our Province is capable of producing anything well, it is capable of

producing apples well. We have a climate that is unsurpassed in America for producing apples, and we have a market in Britain and the Northwest for those apples that is unsurpassed, and the market is distant only ten days' journey. Under such conditions as that one would naturally say that the most profitable thing and the best crop for the farmers of Ontario to grow is apples; and they would do it if they could make it pay every year, and I am sure they could make it pay if they are once transported to Britain in good condition ; and if these improvements that have been introduced this year have been carried out fully and put in force on as many vessels as possible, a sufficient number so that everybody can take advantage of them, I am sure apple-growing will take a stand vastly different from what it has in years gone by, and become one of the most important industries. We have ten millions of apple trees set out. Anyone who is an apple grower will readily compute how much the product would be at paying prices if they were properly cared for, and what a large income it would be for the Province of Ontario. Taking up the other matter, that of cold storage, that is not equally important, still it is a matter of great importance that we find a market for our pears. It seems to me from the experience we have had, that pears and summer apples are about the only fruit that we may expect to be able to land in Britain in good condition and find a ready market there for them. I do not know that we will be able to put our peaches there, except one or two varieties. I believe we can put Elberta peaches there : but our experience so far has not been satisfactory. Where the fault lies, it is the part of this Association to thoroughly investigate and discover. The shippers at Grimsby who have shipped many times had bad returns, but they knew and felt sure that they had put those pears up in proper condition, and had such wretched returns from them that they felt the fault was not with them, but must have been with somebody else, and I can sympathize heartily with Mr. Woolverton in making the statements he has made from time to time. He is surrounded by those shippers, and every time they get those bad returns he hears in both his ears very loudly these bad reports, and he is impressed that there is something wrong somewhere, and he is sure from his experience there that it is not in the packing, and he naturally concludes it is in the cold storage. He knows, as we all know, that any fruit as hard as pears, if it is kept at a temperature of, say, 50 degrees—and that is the highest, I think, that has been stated that those pears were at from their journey from the farm to the ship—ought not to perish very rapidly, even after the three or four days that are wasted from the time they left the packing house until they arrived on board the ship at a temperature of even 50 degrees or 55 degrees for three days. Taking up my own shipment this season, it was a very disastrous one. I know that those pears were packed hard and firm, as they ought to be packed ; I superintended the packing myself. I know, as well as I know I am living, that those pears were put up as hard as they ought to be put up. To put them up harder than they were they would shrivel and never ripen, and the proof of that is in the culls that I took from those pears. A good deal has been suggested about the small pears. I am the guilty man that sent the small pears. I wished to find out whether a small pear that was perfect in other respects, a smooth pear that was free of worms and scab, but simply small, would sell in the Old Country market at a proper price, so I sorted those pears into four grades. First I took out what I would call the culls— that is, those that had knots on them or showed any tendency to be ripe, which indicated that they were worm eaten—at that season of the year there are none ripe except those that have a worm inside. Those were taken out, and of the rest of the pears I shipped 555 cases. I took 650 baskets of culls out of that lot of pears, or just about one-half of them. These pears were bought from the farmers, all for first-class pears. This is one fault I have to record about pears—some men seem to think that we must not send anything but choice pears. Now if you go among the farmers and buy first-class pears, and insist on them taking out the culls—and that is the way my pears were bought, they were not supposed to have brought to me any that had serious knots on at all, and I cannot say but what they did just as the agreement called for—those pears were delivered there, what is commonly called on the Canadian market first-class pears. I divided them into four classes, and took out one-half of them, 600 baskets

out of 1,200, to be culls, and put them in my own cold storage plant, and those pears stayed there six weeks, or three weeks after the others landed in Britain, and I sold them to the canning factory at Grimsby, and the manager said, "I can't take those pears, as they are ; they are too hard; you will have to ripen them." I took them out into the ordinary temperature, and they stayed there four days before they became sufficiently ripened that the canning man could can them at all ; but the pears that I packed, the three grades—firsts, seconds and thirds—I divided them into three sizes as near as could be done with the eye; 1¾ inch is a very small pear, of course, but I expected to make good returns in the Old Country market. My own opinion would have been to send only first grade, but I wanted to test it, and was willing to test it if it was a loss. The next grade was 2-inch., the third was 2½-inch., the part which was really first-class pears. The report I got from the Inspector in Montreal when they landed there was this :—"1¾-inch, rather small; the medium grade, 2-inch, appears all right; the select pears a little slack." Now, when they landed in Britain the astonishing thing to me is that the little pears were the only pears that paid me any money. Here is the account sales :—40 boxes, 1¾-inch., at 4s a box, about 96c; it cost about 50c expenses out of that, which left me 46c for the third grade pears, which are only worth in this market about 20c or 25c. Then the medium grade pronounced all right by the Inspector, 44 boxes that landed sound sold for 3s; and the select pears, that were certainly select, 58 boxes sold for 2s 6d. Now those are some of the things that we cannot understand, and we are seeking for light. I cannot fathom it. The only solution I could possibly give for it is that the small pears were harder, so I think my experiment in sending the small pears was justifiable. I would not like to repeat the whole experiment, for it cost me $330, and I got $48 out of it. Nevertheless, it shows that there is a good deal in this subject that we do not thoroughly understand. Now, whether these pears would have ripened so much between the packing house and the vessel or not I am not prepared to say. I know those pears were packed hard ; they were taken down to Grimsby and put into the cold storage room, which was not as cold as it ought to be, as I understand from my man, from the fact that a great many were going in there, and the doors were open frequently. They were then put on the car, which was rather overloaded; there were 1,000 cases in the car, which is a pretty big load to put in a refrigerator car and get the temperature down as low as it could possibly be got.

The Secretary : They were put in two cars.

Mr. Smith : That is what should have been done. Then, if they were put in two cars I do not see why they should have suffered on the cars, and why they should not have arrived at Montreal in good condition. However, there is how we stand, and it is unfortunate. Other shipments later in the season have always turned out profitable. I shipped some last year, and my Bartletts turned out like this, while later on they turned out well ; the Duchess and Anjou sold at a fair price. I have no agent over there representing me. I ship to the commission merchant. There were 58 boxes that arrived in first-class condition of large pears that only brought 2s 6d. It does not say the condition, it says 58 sold at 2s 6d.

Mr. Shepherd : If you have not somebody to represent you there outside of the commission man, my experience is you will never get satisfaction.

Mr. Smith : I quite agree with you there in every respect. The reason I shipped to the commission man was simply this : I have an agent in Manchester, and I got this shipment up to send to Manchester, intending to send a full cargo. I made application to the Manchester liners for space, and asked them if they would guarantee me some temperature, but no, they would not name any temperature ; they would not guarantee anything, the shipper must take all responsibility ; they take the pay for carrying these goods in their cold storage plants, and charge well enough, too, but they take no responsibility, and I would not ship unless they did that. I sent them along with the Government shipments, understanding that this ship was under a guarantee with the Government to maintain a certain temperature, and that was the reason I changed my shipment directly to a customer, to be sold on commission, which I do not think I will ever do again. But there is the difficulty that we are in, and so far as the perishable

fruit shipments from Ontario are concerned I do not believe we will need very much cold storage space, unless the ship-owners make up their minds that they are willing to take some responsibility and guarantee some sort of temperature somewhere within reason. Let them guarantee a temperature from 34 degrees to 44 degrees if they like—it ought to be closer than that; but even with that I would ship any quantity almost; I would test the market. I believe the market is there. I believe we can sell any quantity of pears there at a profitable price when there is somebody there to look properly after it; but when there is no guarantee of temperature, and the shipper does not know but perhaps they are going to be frozen—as we have been told by some shippers that they have been frozen—when you do not know whether they are going to be roasted or not, you cannot find any shipper willing to assume the responsibility of going into it. Now, I do not know that our Government can do anything more than they are doing; that is to say, exposing to the public their shortcomings; but there is the condition which we have to face, and until we can get a guarantee of some temperature I do not believe that perishable products will be sent from here in very large quantities. Professor Robertson spoke of California peaches and pears going forward in good condition, but we must never forget that a California peach is dry, and will ship almost like a turnip, or a Keiffer pear, anyway. You can put a California plum on a stand in a store here and it will stay for two weeks. California has a rainless season practically, and their fruit has not the juiciness that our Ontario fruit has in our climate.

Mr. Boulter: How is it the Michigan peaches will stand better in shipment?

Mr. Smith: I was not aware that they would. You have had an experience in it. There are some varieties that will carry better than others. Even our Elberta will carry very well. I am seeking for remedies and light on this matter. There is a fault somewhere. The growers are inclined to lay it on the cold storage, which is away off across the ocean. The Department is there, and they are apt to blame the growers and the packing. Now there may be men who pack fruit too ripe; I do not doubt from the evidence we have had that some was put up that should not have been put up, but I do not think the fault is in regard to ripeness; the fault lies somewhere between the packer and the salesman on the other side. (Applause.)

A. H. Pettit: One other point I would like to inquire into. I understand from Prof. Robertson that large quantities of Bartlett pears were shipped from Montreal on the same boats on which our western pears are shipped. Probably the Bartlett pears from Montreal are better keepers than others. I would like to know whether those pears came from the Province of Ontario by baskets and boxes, and were repacked by the Montreal people. Now, if they in Montreal can get our pears from the west and repack and reship them and get them in good condition, I do not understand why we cannot do it from Ontario, where they are put up directly from the orchard and put into cold storage.

Mr. Smith: Were they Ontario pears?

A. H. Pettit: They surely were not Californian, and if there is a Montreal gentleman in the room I would like to ask him how successful they are in growing the Bartlett pear in Montreal.

Mr. Shepherd (Montreal): They can grow the Bartlett pear, but they are not grown to any large extent. I am not aware that there is anybody who exports Bartlett pears grown in and around Montreal. They are not grown commercially to any large extent. The Flemish Beauty is being planted out around Montreal to considerably larger extent every year, and they are succeeding very well. I visited the Trappist Monastery with Professor Freeman in the first week in September this year, and we saw there, I think, fully 50 trees of Flemish Beauty that were bearing most admirable specimens of this fruit. I was going to make a few remarks about this cold storage question. I have had a little experience in exporting first-class Fameuse in boxes for the last twenty years, and although I have not made a practice of shipping in cold storage, yet I utilize cold storage in this way. In the last five or six years I have had considerable experience. In the first place let me tell you that if you allow an apple to get what we call ripe, fit to eat, no amount of cold storage will keep that apple any length of time;

in fact it will decay more rapidly. If you wish to ship first-class table apples in good condition you must start the fruit in good condition from the very beginning. (Hear, hear.) You must pick your fruit at the right time. I pack the Fameuse in boxes that perhaps some of you remember, in this shape (engraving shown) like an egg case. You must pick them before they are ripe. You must line your case. You must use a packing table that is only a frame covered with canvas. When the pickers come with their baskets they handle them like eggs ; I try to instil into my pickers the idea that they are handling eggs all the time. Then they are packed in the boxes at once, which are nailed up that day and sent to cold storage the next day. The fruit I am shipping to England I try to send to cold storage 48 hours after it is picked. I consider that is a first principle. You must start right. Another thing I have gained by an experience of some years in putting fruit into cold storage is that I do not ship from Montreal in the month of October, when the temperature in the streets is above 50 degrees; that is one of my rules. In the month of October frequently in Montreal we have it up to 80 degrees outside on the shady side of the street, and in the third week of October in this year it was 75 or 80 for a whole week. I did not ship an apple that week. I did the most of my shipping this year in the month of November, and I have not had any complaints at all ; in fact I could read you letters which have been sent to me from people who have received the apples which speak very highly of them, though I have never asked for the letters. I have given up commission men a good deal. I tried that for some years. Prof. Van Deman mentioned that it took about a week for an apple to get a temperature to the inside of a barrel in cold storage. I will prove that fact in the inverse way. About the 15th of August, 1900, I sent to the cold storage 21 barrels of green Duchess. My intention was to ship them in cold storage to Liverpool to sell as cooking apples. They were uncolored Duchess on the green side. Apples of that class were selling in Montreal on the 15th August, 1900, for about $1 a barrel. I arranged with a ship of the Dominion Line to take them into cold storage about the 29th inst., and left orders with the Union cold storage people to ship them by the steamer Dominion in cold storage. I left for Ottawa that night and did not return to Montreal for two days, and when I went to the office of the Dominion line to prepay the freight they told me that those 21 barrels did not go in cold storage. I said, "Why, I made that arrangement with your office, and surely the cold storage people did not ship them in the ordinary compartment on the 29th August, when it was 80 degrees outside ?" They said, "Yes, they went in the ordinary compartment," and added, "When they came down we had no cold storage except for butter, which was too cold, and when the carter telephoned to the Cold Storage Company they said, "Let them go !" I said, "I am sure I shall not get enough to pay for the freight for this lot of Duchess." I shipped when the temperature was 80 degrees ; they could not possibly arrive in Liverpool and be anything but mush. But, to my astonishment, when I got my returns from Liverpool they were billed at 10s a barrel, and the only explanation, I think, is this, that the fruit, having been 14 days in cold storage, was so thoroughly cooled that they did not get too warm by the time that they arrived in Liverpool, and they were sold at once. (Hear, hear and laughter.) That was a considerable experience. But then I may say this, that that lot was 20 barrels, although there were 21 sent down. In November last year the Union Cold Storage Company telephoned to me that there was a barrel of Duchess in cold storage, and I went and opened it, and it was in the same condition as when it had gone in. I determined to try an experiment. In January, 1901, I left for Ontario with my wife, and left orders with the Union cold storage to sell that barrel of Duchess at the next auction sale of the fruit exchange. I got my returns when I was up in Owen Sound a few days afterwards. That barrel was sold on the 18th January for $2.50, when, if I had sold it in August, I could not have got more than $1. Well, that gave me considerable insight, so this year I have a lot of Duchess in cold storage, and I am not going to sell them until about Christmas time and they are on the green side, of course, cooking apples. But it cost me considerable to find out this, and I have learned that if you put an apple into cold storage when it has arrived at the condition which we call ripe, good to eat, it is too late to keep that apple in cold storage.

You must take it before it is in that condition, and send it to cold storage at once, not keep it at your farm, and it will keep for months. Everybody does not know that, but it cost me $50 to learn it.

Mr. Dawson (Toronto) : I have had considerable experience in taking apples out of cold storage and shipping them by ordinary freight to England, and I have always made it a point to find out what compartment they went into. Every time they went into the forward compartment below the water line they arrived in good condition, otherwise they did not.

R. J. Graham (Mayor of Belleville) : I have had some experience in cold storing apples, and having cold storage of my own and dealing in apples, and I have found that what Mr. Shepherd stated was strictly correct. Apples put in cold storage, if they are ripe—that is, fit to eat—will not keep in any cold storage, I do not care what temperature you may put them at. I have in my storage now apples from Missouri that were picked in a temperature of about 100 degrees, that were gathered in perfect condition and as large as could be, and brought to Belleville, and they are now there, and have been there since the first week in September, and I have no doubt that those apples would keep there indefinitely if a proper temperature was maintained. I believe that a great many of us who store apples with cold storage people blame the results when the fault is our own. We gather the apples, leave them in the orchards sometimes for weeks, and possibly in some cases nearly a month after they are picked from the trees and left under the trees on the shady side in most cases, and then send them to cold storage along about the 1st of November, and expect the cold storage to keep those apples. Well, it will not do it. Apples as soon as they are gathered from the trees should go at once into cold storage, otherwise you might just as well keep them in any common storehouse ; and I think that thousands and thousands of dollars are lost to our fruit exporters by the mismanagement of their fruit. This year I have some thousands of barrels in store for dealers who failed to send that fruit down till away along in November. Well, now, they cannot expect that that fruit will go out in the same condition that it would had it been put in in the condition it was when gathered. It will go out at a loss unless the market is in their favor. Duchess or Astracans, or any tender varieties, if they are gathered when hard and firm, put at once in store at a temperature of 30, will carry for an indefinite length of time. People differ as to the temperature at which apples will keep in cold storage. I have been experimenting for three or four years in that line, and I find apples will carry at 30 degrees, and will not freeze, and they will keep in splendid condition. It has been stated by some who have stored apples that they much prefer them carried at 34 degrees to 36 degrees, but my experience is that at a temperature of 30 degrees they will keep best, and carry in first-class shape.

E. D. Smith : Would the fruit itself be exposed, or in barrels ?

Mr. Graham : In barrels ; but this year, to satisfy myself on that score as to what temperature apples would freeze at, I ran a room down to 29, and left some apples exposed in an open box, and I kept that room at 29 for a week, and they did not freeze. I had a little experience this year in shipping apples in cold storage to Liverpool on the steamships from Montreal, and I must say the result was very unsatisfactory. If the proprietors of the steamships do not regulate their temperature better than they have this past season it will not pay us to use their space. I would very much rather have the forward hold below the water line, as Mr. Dawson suggests, in common storage, than the present system of cold storage on the steamships. They charge a high rate on it, and guarantee nothing, and give us very irregular temperatures. Now, a temperature that varies from 25 degrees—in some cases I have found it to go down to that and all the way up to 40, is very much worse than a temperature of 40 degrees all the way through. Irregular temperature up and down will invariably spoil anything. It has been stated that fruit will spoil much quicker out of cold storage than it will if it had never been carried in a temperature so low. I have had considerable experience in that line, and I believe that apples carried at a temperature of 30 degrees and then taken out, even in

warm weather, say at 80 degrees, will keep much longer than if they were gathered off a tree and never had been chilled. I am quite satisfied of that.

Geo. E. Fisher (Freeman) I would like to ask Prof. Robertson a question. I understood you to say this morning that the intermediaries who stowed the fruit on the vessels, and those who kept the temperature right in the compartments, did not fail to do their duty. Now, how do you know this ?

Prof. Robertson : I was speaking of the cold storage. The records which the ships' engineers give tally with our thermographs, which are independent and locked in the chambers. That is the evidence I have, which is, to me at least, quite satisfactory.

Mr. Fisher : In the last shipment that went in cold storage from Burlington to Glasgow the report from the receivers is that some of the packages had ice on the outside of the packages when they were delivered, and when they were opened they found ice on the fruit, and when this fruit was sold it sold at very irregular and unsatisfactory prices. Some of it was all right, some of the prices were good, but the majority of the prices were very low, and we found ourselves short several hundred dollars in the shipment. We would like to know the reason why.

Prof. Robertson : I think Mr. Fisher will remember that he sent me a statement of that, and I forwarded the statement at once to the steamship people. The ship happened to be in port with the ship's engineer, and they sent back the full statement of the log and the captain's and the steamship's engineer's statement that the fruit was evidently, from its appearance—they did not open the cases—in good condition when it was delivered in Glasgow. That is all I know about it.

Mr. Fisher : Yes, and his statement says that the receivers approved. Now these statements conflict, and who are we to believe ?

Prof. Robertson : Well, I suppose it is between those two Scotchmen ; I do not know. (Laughter.)

Mr. Fisher : The gentlemen we have been dealing with in Glasgow for the last ten years are people in whom we place a great deal of confidence, and we are disposed to believe them, and we believe that the fruit was not fairly treated on board the steamship.

Prof. Robertson : I may say this is the position of our Department, at any rate. As soon as we were able we got thermographs, which are self-registering thermometers. We were not able to have more than thirty of these in use before September this summer. We have thirty more now, and will have several more next spring. Now, any shipper in cold storage hereafter who writes and gives the facts will get a copy of the thermograph chart—that is the best we can do—and the report of the inspector at Montreal and at the landing port on the official form. Notwithstanding these there may be differences of opinion and mistakes, but we will furnish that information, and if we can get more I think the Department will try to meet the situation.

Mr. Fisher : Have you an agent in Glasgow whose business it is to see these goods unloaded ?

Prof. Robertson : Yes, who does nothing else—Mr. J. B. Oak, an Ontario man—who sees every ship unloaded, and who watches that the goods not in good condition, when they are put out, are properly handled.

Mr. Fisher : We feel that goods with ice on them are not fairly dealt with, and that ice is found on the fruit when a package is opened looks worse still.

E. D. Smith : I would like to ask Prof. Robertson if he is sure these thermographs cannot be tampered with in any way ?

Prof. Robertson : Oh, they are quite safe. There is a drum around each ; there is an arm with a pen-point that goes up and down as the temperature varies, and the drum turns once in fourteen days. The pen-point will register on the drum as the temperature varies. The thermograph is put in an oak case filled with holes, so that the air will get around it. That is locked in Montreal, and the key is kept in Montreal. There is no possibility of tampering with them. Our agent at the other side takes it out.

Mr. Fisher : There is another question I would like to ask in regard to the most suitable package for putting the fruit in for cold-storage purposes. Is a tight package or a ventilated package best ? We have in use what we consider, and what you yourself have said, is the very best package that we can have for our purpose, and we have used that package for a number of years and found it very satisfactory for export ; but this year I put a considerable quantity of Bartlett pears both in a non-cold storage in Montreal and also in a cold storage building in Toronto, and in those packages. The pears were put into cold storage about the 1st of September, and they were not examined until about the 1st of November. They were there about two months ; when they were put in I had prepared three boxes as tight as they could be made of about the same size, scarcely as large as those packages that were used, and we lined these boxes with heavy wrapping paper, placing the paper in the boxes. The sheets were large enough to fold over the top, and when the cases were filled with fruit we doubled over the end of the paper and nailed on the cover and made it almost air-tight. Those three boxes were placed in a cold storage building in Toronto at the same time as the others were put in, and were not examined until the 1st of November. The ordinary cold storage package that we used had the fruit considerably wasted, but when I opened these tight packages I found the fruit in splendid condition, and if required to be exposed to the heat of a stove for several days before it was in eating condition. Now if a tight package is preferable to a ventilated package for cold storage purposes it is worth knowing.

Prof. Robertson : There is no one package that will suit all kinds of fruit or all kinds of uses. The reason we do not recommend or want tight package for pears intended for shipment is this, that there is no means whereby you can cool down pears quickly, at least for immediate shipment, if you put warm pears in a tight package. If you have only a few boxes in a large cold storage building you can cool them down very quickly. It has been shown by experiments in Washington that it will take a week to cool down apples in a barrel. We wanted pears cooled down in two days. I think that pears will keep better in an ordinary compartment in a tight package.

Mr. Fisher : I think the experiment is worth carrying further. It would seem to me from our experience and what little I have learned from outside sources, that we should know more about the merits of a tight package. Mr. Shepherd says that he packs his apples the same day that they are picked. That, in my experience, has been found to be a very bad practice ; I never do that. I prefer to leave the fruit exposed to circulation at least one day, so that the heat of the sun can get well out of it. We like to have the individual specimen reduced to as low a temperature as possible before they go into the package ; I think that is the right idea.

Mr. Shepherd : Allow me to explain ; I was talking of apples packed in boxes.

Mr. Fisher : Well, we never use anything else.

Mr. Shepherd : My experience is that the sooner they get into cold storage the better; and also I have no faith in open boxes for apples. I have never tried pears.

Mr. Fisher : You like a tight box ?

Mr. Shepherd : The tighter you can get them the better. My box, as you will see, has ventilation in finger holes like a beer case.

Mr. Fisher : We have had our boxes made in that way for years, but we did not cut through the boards.

Mr. Shepherd : I am going to have an absolutely tight box after this. The tighter they are the better they carry.

Mr. Graham : I think you will find it makes a great deal of difference as to what kind of apples you have in storage. I tried some experiments on that with a crate made of lath, and I found that some varieties, such as the Greening, would carry better in a crate, while the Russet would be very much better in a tight package. (Hear, hear.) I am thoroughly satisfied you can carry a Greening very much better in cold storage in an open crate than you can in any kind of a tight package, and it will not discolor when it comes out. Take an ordinary Greening in cold storage, and take

it out any time after being in a tight barrel, and under ordinary circumstances that Greening will turn brown. It wil discolor on the outside; so will the Grimes' Golden.

Prof. Saunders: What variety was that you spoke of as having come from Missouri ?

Mr. Graham: I have Ben Davis and Missouri Pippin and Wine Sap and Jonathan. I think experiments carried on along that line will be valuable to an Association like this.

Mr. Thompson: Are those thermographs placed only one in each compartment ?

Prof. Robertson: That is all that have been placed so far, and not even one in each compartment.

Mr. Thompson: It would be wise in future to put one in different portions of the compartment, in view of these conflicting statements, to see if they will tally.

Prof. Robertson: We will do that in a few experimental compartments. The smallest compartments I know of holds two carloads, and they run from that to four carloads, and they run up to 5,000 cub. ft. Some of them were even bigger than that on the Bristol Steamships. It has been suggested that I say a few words to gather up a few points that have been gleaned from this discussion. The shipment from Grimsby this year make it quite evident that if you take any quantity of pears coming in from growers the smaller pears are harder and less ripe than the large pears in the same packages, and to my mind that both explains and throws light on the reason why these small pears sold for 3s a case, whereas the large pears sold for very much less, because they were in a riper condition, further grown. Now I got a letter even since I spoke this morning about another shipment on that same ship. This is another Canadian shipper who sent pears on that same ship and he says:—"The fruit when packed was in good condition, but was a long time in reaching the market on account of waiting for the boat, and arrived in a somewhat over-ripe condition. The best sold at about 4s a box." Those were also Bartlett pears from another Canadian shipper on that ship. The gist of the whole thing to my mind is this—that is what I have been gathering the last year or two—that when any fruit gets to a certain stage of ripeness cold storage will not arrest the changes that go on, though it may perhaps delay them, but if that fruit is put into cold storage in such a firm, sound, green condition with that degree of ripeness, when this ripening and inter-cellular casein and such things are there, then the fruit can be held almost indefinitely, and it is a question about getting the fruit into cold storage in that state. We have been discussing the desirability of having an experimental cold storage built for that purpose, which we hope to have at Ottawa this next summer, to discover the various tempertures at which things can be kept safely, and the various degrees of ripeness in regard to fruit and cheese and other things that will make it possible to keep them. That seems to be the one thing we have learned from all our experiments that was not before known, and the guidance we have learned out of this discussion. One thing more, that if you have coming out of cold storage, in England, tender or other fruits at a temperature of 35 degrees, 36 degrees, 37 degrees, into the ordinary atmosphere any time before the middle of October, or even before the end of October, you take a risk of the fruit condensing on its surface so much moisture as to make it spoil; and so for apple shipments you will find it much safer for the tenderer sorts to cool them thoroughly in the cold storage and put them in those circulating chambers where the atmosphere never goes below 45, and then after an ordinary space to go into some place where they will be brought to 50 degrees or 55 degrees and landed in a firm and dry condition. I think we are on the way to make a good deal of progress in these matters, and I have nothing to add to what I said this morning beyond this one remark, that above all men in Canada in this Convention I have no reason to or no desire to impute motives to anyone except that they have been seeking to benefit all the fruit trade of Canada in the interest of the Association at large (Hear, hear). When I cited these things from the Horticulturist I did not make a single qualifying observation that would indicate that anyone was wilfully doing wrong, but the statements were

in direct conflict with the facts which I thought it needful to bring before the Association, and therefore I had no thought that Mr. Woolverton, above all men, was seeking to do wrong or mislead, but one particular statement in the "Horticulturist," that relating to the shipment on the "Manchester Trader" and the other ships fitted up by the Department, was so thoroughly misleading and had been brought to the attention of the writer ten months ago, that it was needful to make it public to have it right, and that is why I took the liberty of bringing it up to-day, both by my own feeling and the Department. I had no feeling towards Mr. Woolverton, and I hope that good will come out of this discussion both to the Association and to the fruit industry, and I thank everybody for the patient hearing and for the kindliness of the discussion. None of us have anything to gain except good to Canada and the gain they will get from the general prosperity.

Mr. Boulter: I have listened very attentively and with great pleasure to this discussion of cold storage on ships. I understood you to say this morning that the Railway Companies did not or would not make any changes in the present refrigerator cars. One reason why the California fruit is carried so well is because of the refrigerator cars of the California Fruit Exchange, which are labelled "C.F.X." One of the largest commission men in Toronto told me that he has kept peaches, pears and plums coming from California on the track for ten days perfectly sound and good. You stated that the losses, if any, would be caused by the doors of the cars not being properly closed. Last year I bought a car of Bartlett pears from Mr. Smith, and he took them out of the cold storage and put them in a refrigerator car, and after a passage of three days all the pears were damaged very seriously, though not exactly spoiled. There was no delay in that car, because Mr. Smith and I arranged for the rapid transhipment of it, and also for the ice being in it. This year I bought a car of peaches in Toronto, and they were brought over on the Lakeside to Toronto from St. Catharines and shipped that night on the Grand Trunk refrigerator car, with ice and all, and over half of these peaches were spoiled. Now are we to know that our refrigerator cars to-day are not up-to-date and will not carry our stuff from St. Catharines or Grimsby to Montreal in perfect condition while the California fruit is brought in good condition after ten days' travel? This is a fact. So much so that I have had to ship large quantities of pears by the Richelieu boat. Too much blame should not be attached to the vessels with cold storage, because no doubt the goods do not get there in a proper state.

Prof. Robertson: There are two difficulties. The Railway Companies tell me that the latest cars they have built are built almost similar to and quite as good as the California cars, but as a matter of fact they have cold storage cars that were built twelve or fourteen years ago, and these cars will go around into local service, and so while they are building refrigerator cars now for us as fast as they can of the newest and latest style of insultation and cooling, still the old refrigerator cars are on the routes and I think the losses come from them.

Mr. Boulter: Both of those cars I referred to were new cars. We would not take chances of an old dilapidated car, and that is the result.

The President: This is a very important subject. We gave all the forenoon and a part of the afternoon to it, and we will now have to shut off any further discussion of it. We have had a flood of light, and we find we are working on the right lines. I think it will not be long before we have a perfect system.

FREIGHT ON FRUITS.

By H. W. Dawson, Toronto.

I am proud to state that I have the honor of being the son of the man who shipped the first carload of Canadian apples to Europe something over 35 years ago (Hear, hear). He packed them in a very primitive way, and even during the first five years was very successful. He packed them by using a rail as a lever, a chain attached round the tree in the orchard, for pressing the head in. Since then great improvements

bave been made, and I have seen the export trade in apples grow from its infancy, and possibly I know as much about it and probably have handled as many apples as any man in the trade. When asked to address this Convention on freight rates, or upon the question, why should a barrel of apples pay more freight than a barrel of flour ? I did not realize that the apple was discriminated against to the extent that it is ; neither did I think that fruit of all kinds was discriminated against to the extent I find it. I will not attempt to answer the question myself, but will give you some of the replies given me by railroad and steamship officials, and intersperse some little personal experiences by way of comparison as to whether their replies are warranted by the facts. Perhaps before giving you these replies or experiences I had better establish the fact that a barrel of apples does pay more freight than a barrel of flour. We will take London, Ontario, as the basis of operation. During the year 1896 the freight on a barrel of apples to Liverpool was $1.07.47 to $1.31.67, and to Glasgow $1.47.27; and flour to the same ports was 72 cents. Late in the season the rates were reduced to 98.47 cents and $1.23.67. In 1897 apples paid 92.78 cents per barrel ; flour 60 cents per barrel. This year apples via Montreal paid 80.78 cents to $1.08.18 and flour 38 cents per barrel ; and at the present time via Portland or other Atlantic ports, apples pay 76.58 cents and flour 38 cents per barrel. In 1896 the freight on a car of 150 barrels of apples was $161.20 to $220.90, and on a carload of flour $108, the car of apples weighing 24,750 lbs., the car of flour 30,330 lbs. a difference of from 50 per cent. to 109 per cent.; but if both paid freight according to weight the difference would be 62½ per cent. to 136 per cent. This year the freight on a car of apples is $114,87 to $121.17, and on a car of flour $57, a difference of 100 per cent. to 125 per cent. on the barrel basis, and 135 per cent to 162½ per cent. on weight basis. Notice, please, when apples are plentiful, up go the freight rates, as in 1896, and when not so plentiful, rates are lower ; while this year grain and flour are plentiful, freights are lower on those commodities. While the rates I have mentioned apply to export trade, the same rule applies to local rates. Apples and fruits pay from 20 per cent. to 100 per cent. higher rate than flour. Now, having established the fact, I will give the replies of the carrying companies' officials. I put the question to an official high up in railroad circles, "Why should a barrel of apples pay more freight than a barrel of flour ? His reply was, "Because apples are perishable and require more attention than flour." Then I said to him, "supposing I were to ship a carload of apples and a carload of flour to go by a certain steamer to Liverpool or other port, and on arrival at seaboard it was found that the steamer could not take either of them, and there was only room in the shed for one carload, which would you put into the shed ? and he replied, "the flour." I said, "Pile the apples up on the wharf exposed to all kinds of weather ?" and he said, "Yes." "Why," I said, "I thought you charged a higher rate of freight on apples because they needed more care and attention, and yet do not give them the extra care and attention they pay for." He said, "Why, the weather, rain, etc. does not hurt apples, but if the flour were on the dock it would be spoiled." Gentlemen, was his logic right ? I will venture the assertion that treatment of this kind to our fruit has more to do with it landing in bad condition on the other side of the Atlantic than either bad packing or bad fruit. Another railroad official replying to this question said. "Who built the railroads of this country ? Who paid the bonuses ? For whom are the railroads operated ?" I do not know what he meant, nor could I get him to explain ; but he said, "Think over it;" and I would not like to assume what he did mean, but I think if the obligations the carrying companies are under to the municipalities and governments that gave them bonuses, grants and charters, were fully met, we would have very little reason to complain, as the railroad and steamship lines would be operated in the interests of the people, and not for the high-salaried officials and stockholders, and we would have a better equalization of freight rates. (Hear, hear and applause). Still another railroad official replying to the question said, "Because we can get it." (Laughter.) I think this reply about as near the truth as any ; and that led me to believe that there was only one way in which the freight rates on fruit could be remedied, and that would be by united action on the part of growers, shippers and handlers of fruit. You take millers

and grain dealers; when they want to get special rates, or their freight rate lowered, they can do so by united action, and they bring that united action through their Boards of Trade or through other influences that are powerful. Well, why cannot the fruit interests of this country unite and bring pressure just as powerful as the men who are interested in other trades? So long as the handlers and shippers of fruits stand apart as they do now it will always be as it is. A steamship official's reply was, "Apples being fruit and of a perishable nature, we are bound to charge higher rates of freight" Then I asked him if any special stowage was generally given to apples, he replied no, but said "We generally make deck freight of them if possible because easier handled than general freight. We want to load and unload our deck the quickest." And still all this time we are paying a higher rate of freight to get care and attention. Another steamship official gave me about the same reply; but I asked him what special care they gave for the extra charge, and he said, "I cannot tell." Then I asked him why their freight rates fluctuated so much, and why rates were so much higher in 1896 than since that time, and he replied, "We always take advantage, if possible, when large quantities of perishables are moving, and make all we can out of the situation." I might divert somewhat from the subject just here, and call your attention to the apple crop of 1896. The year that so much money was lost by Canadian shippers. The crop was abnormal, freight rates were excessive and losses heavy, and after careful estimates by interested parties, it is believed that if the extra freight rates charged that year were put into the hands of the apple shippers of that year (some of whom have not recovered their losses yet) there would be sufficient to meet these losses, and instead of being bankrupt, some of them, they would have come out even or perhaps a little ahead.

I think I am perfectly safe in saying that, if apples had had the proper care and attention in transit that they are paid for, the losses to apple shippers would have been very considerably less. To illustrate what I mean I will give you a little personal experience. We contracted with a certain steamship line to carry a certain quantity of apples, so many barrels per week, and in order to carry out our part of the contract we shipped the quantity agreed on each week, and on one of the weeks the steamers could not carry all we sent down, and as the cars had to be unloaded the apples had to be piled up on the dock, and the apples sent the following week out on the steamers intended, but the apples on the wharf were not loaded for three weeks, apples shipped nearly two weeks after them being in Liverpool and sold before the ones left on the dock. Those that went right through either made a profit, or loss was very small, but the ones that were left on the dock so long did not realize the freight when they arrived at Liverpool, simply because of the condition, said bad condition being caused by extra care and attention in transit for which steamship charged high rates. I contend that if we had a quicker transportation, better care and attention while in transit there would be less complaint of bad Canadian apples, and personally I would not object to paying more freight on a barrel of apples than is paid on a barrel of flour if fruit got the extra care and attention necessary. Now we keep hearing the cry, "Only send your best apples to Great Britain"! and my experience has been that I can do better with my fruit at home. It is customary in England to unpack apples put into storage before shipping to England, making three grades of what was only one in the autumn, and my experience has been that eight times out of ten the second and third grade apples sell in England for more than the first grade. Why I cannot tell, and I have asked men who were handling these apples the explanation but could never get a satisfactory explanation. The only conclusion I can arrive at is, that as they sell the apples by weight, the second and third grade will weigh more than the first grade, and the men they send down to the dock to examine those packages heft them in some way or another, and they pay the most money because those fruits weigh the most. It also happens that the best apples suffer most in transit, and that those which are the best in quality and packed equally as well as the inferior ones are in the worst condition when they arrive at destination. Such would not be the case if proper care were given in transit. How can we accomplish the getting of freight rate on a more equal basis, and

also the proper care and attention while in transit ? First, by united effort on the part of the shippers and handlers to secure the desired object—we must pay more attention to the packing and the handling of our fruit, and to getting the cost reduced of conveying it to the customer.

Mr. Rickard : I would like to ask why the Grand Trunk Co. charge 20 cents a hundred more for pears from Toronto to Montreal than they do for apples ?

Mr. Dawson : I asked that question of one railway official, and he said "Why, pears are higher priced—(Laughter)—"Pears are heavier and more valuable." Well, I called his attention to the fact that we are paying more for apples than for pears, and then he could not give me any explanation at all.

Mr. Huggard, (Whitby) : As a matter of fact an apple barrel will contain nearly 200 pounds of pears, but only 165 to 175 pounds of apples. I have repeatedly asked Grand Trunk officials why they charge more for transportation of pears than apples, and they said, those were the more valuable and consequently were entitled to a higher rate of charges.

Mr. Dawson : Those of you who are acquainted with the fruit trade of California will know that by united action they have accomplished a great deal in having their freight rates put on an equitable basis. They have their fruit shipped from the Pacific Coast to the Atlantic Coast at the same rate as any other commodity, and in fact at a smaller rate than a dry product of the same fruit.

Mr. Huggard : When I requested the Grand Trunk Railway to send pears in their refrigerator cars that were shipped from Hamilton they would not do so, and the consequence was, as I was obliged to send them to Montreal, they went through on the same express and were sold there. I would like to see this Association interview the Government or the Railway officials, or some one, in order that we may get equalized freight rates. It is perfectly ridiculous that people in Cobourg have to pay the same rate for a basket of fruit to Montreal that they do from Grimsby, nearly double the distance. The rates, either by express or by freight are so exorbitant, that it takes all the cream off the value of the fruit before it is landed at its destination.

Mr. McKinnon : There is a Committee on Transportation, and when their report comes out we can discuss the question.

Mr. Eben James : This is a very vital question, and while any shipper will endorse a great deal of what Mr. Dawson has said I think we must look at it from the steamship and railway standpoint for a moment. As it is to-day we get a rate say 73 cents from any point east of Toronto to Portland or Boston, and our apples are put on the fastest trains and get an express rate of 24 or 36 hours. We know very well that flour does not go on these trains. Our apples are put on the very fastest trains, and go along with meat from Chicago and so on. Were we to get the same rate as flour we should kick very much if our apples made no better time than flour, and there are dozens of vessels that take flour out of Montreal that we would not ship our apples on at all. When the Thompson line used to run here some years ago, and they took nothing but the coarse fruits, it was the exception for them to have a barrel of apples, because they had not the steamers accommodated to them, and while there is certainly a big difference, freight rates are like any other kind of exchange, and steamers will tell you that they are carrying freight at a loss, and they are going to withdraw some of their tonnage, and when there is only a small proportion of everything they will get as high a rate as they can. In the case of one of those fancy barrels of pears going astray the shipper makes a claim for $7 or $8 on the Railway Co., whereas a barrel of apples only costs $2 or $3.

AMATEUR ROSE GROWING.

By J. G. Jackson, Port Hope.

I wish it to be distinctly understood that this paper is based on my own experience in Port Hope, and does not apply to the north and northwest parts of the Province. Roses which bloom to perfection in this part of Onartio could not be recom-

mended, say, for Algoma, or any of the counties north of Simcoe.

The word "amateur" has a very broad meaning, and covers a very large territory. As a matter of fact, it is difficult to draw the dividing line between "amateur" and professional.

A person may be classed as an amateur who can barely distinguish a "Paul Neyron" from a Red Cabbage, or a "La France," from some of the beautiful pink peonies which adorn and beautify almost every garden in this Province. Or he may be one who has all the qualifications of a professional, yet does not come under that class, simply because he enters this field of floriculture for the gratification of pleasure, and not for a livelihood. Thus it will be necessary for each individual to give his or her own definition of this word.

In the preparation of this paper I have carefully striven to make it as practical as possible, and in order to do this it will be necessary to suppose a person who wishes to grow a few roses, but has little knowledge of this subject. It is altogether probable his first step would be to consult some of the catalogues issued by the various wholesale houses in this or the adjoining country (and which, I regret to say, are altogether too much exaggerated, consequently misleading). He very carefully goes over the list, first the "reds," second the "pinks," and, lastly, the "whites," then marks his choice according to the description given, and forwards his order to be shipped as soon as the frost is out of the ground. To the inexperienced this mode of procedure will be considered all right, and perhaps it is—I say "perhaps," advisedly—but as a matter of fact the most important points have been neglected. In due time the trees arrive, and what are they ? Roses, certainly. Are they one year or two year old plants ? Are they on their own roots, or on the Manetti stock ? Are they propagated and grown under glass, or are they field-grown These are some of the questions that are of vital importance, and yet, I venture to say, these very questions receive but little, if any, consideration at the hands of the prospective rose grower.

Let it be thoroughly understood that unless specific instructions be given when ordering, as to age of plants, budded stock, or otherwise, nurserymen will send what suits them best.

Another important matter, and one which should receive careful attention, is the planting, especially of low budded stock, which should be placed so that the point of contact (or, in other words, where the bud is inserted into the briar stock), should and must be placed at least four inches below the surface of the ground in order to secure the best results. Roses planted in this way will very soon become established on their own, as well as on the briar, root.

Then if we wish to bring the rose to its highest point of development there must be proper conditions. In the first place, a good clay ground is very necessary, and in the second, it is simply impossible to make it too rich. Well rotted manure from the cow stable applied in the fall or spring will be found to produce good results. Through the early summer months a liberal application of hardwood ashes will give a deeper green to the foliage, as well as harden the stems. If the above suggestions be properly carried out, and the ground kept free from weeds, and loose about the brushes, the grower will find a profusion of bloom as a reward for his labor.

A paper on this subject would be incomplete were it not to include a list of "Hybrid Perpetuals," as well as a few "Hybrid Teas." It is well known to every rose grower that there are some varieties that stand out prominently ahead of others, and should receive special recommendation. Of the "Hybrid Perpetuals" I will name half a dozen of each color that I prize as the best all-round roses in my collection :—"Charles Lefebvre," "Earl of Dufferin," "Gen. Jack," "Madame Masson," "Jules Margotten," "Alfred Colomb," "Baron de Bonstettin," "Mrs. John Lang," "Baroness Rothschild," "La France," "Mrs. Geo. Dickson," "Paul Verdier," "Jennie Dickson." The whites are :—"Merville de Lyon," "Margaret Dickson," "White Baroness." "Marchioness of Londonderry," "Kaiserine Augusta Victoria," "Coquette des Blanches."

I would say to the prospective rose grower purchase all the above, but a selection can be made from this list that will, under ordinary circumstances, give good re-

sults. The above named varieties belong to the "Hybrid Perpetuals" (so called). To those of limited experience I will just say the word "perpetual" is somewhat misleading. It does not mean that this class of rose will bloom all through the summer. They produce one crop of flowers in June and July, and occasionally in autumn, but are not perpetual bloomers, as the name would indicate.

For bedding purposes the "Hybrid Teas" will give a fairly continuous supply of bloom, and are perhaps the most satisfactory roses grown.

It seems impossible to separate advantages from disadvantages; in fact they appear to be inseparably connected. While we have the everblooming quality of the "Hybrid Teas,' they have not the stout, strong, hardy nature of the "Hybrid Perpetuals" However, this need not deter anyone from including a few of these in his collection. If properly covered and kept dry through the winter months they will open up all right in the spring.

Next variety in order is the "Tea Rose," still more beautiful, yet more delicate and tender, and more particularly suitable for forcing; although if bedded out during the end of May it is possible to secure a few choice blossoms during summer. Although the size of the latter variety does not equal either of the former, yet it possesses a beauty which is simply beyond description.

PRUNING.

With regard to this matter I know there is a diversity of opinion. Some prefer fall as the proper time, others again claim the spring as the best time; personally I like to wait and see how much pruning 10 to 15 degrees below zero has done for me. It is a light task, if found necessary, in the spring. Experience has taught me that there are some roses which require more pruning than others; for instance, "Margaret Dickson" (a strong, vigorous grower), will not produce bloom if severely cut back. Then there is another class that will not bloom unless severely pruned. Thus it will be seen that if we want the best results we must study the individual nature of each rose, which varies to the same extent as does human nature. It is in this regard that we recognize the hand of the Creator. There is not a tint that paints the rose, nor decks the lily fair, but speaks out most conclusively, at least to my mind, that God is everywhere.

Has not the artist exhausted his skill in trying to reproduce this—the "Queen of flowers" ? The poet has endeavored for centuries to sing its praises; yet both have failed to do justice to this lovely flower. We inhale its fragrance, we gaze on its profusion of color, from the pure white to the deepest crimson. We examine its every part, and the more we study the deeper becomes the mystery. But as the finite cannot grasp the workings of the infinite, we are forced to exclaim, "The hand that made it is divine !" If time would permit we could show how the study of floriculture broadens and develops our social and moral nature. I know of no study that will assist us to reach those heights of true manhood and pure womanhood like that of floriculture. How necessary, then, that we should strive to inculcate into the minds of others, more especially those of the young, whose minds are sensitive, the necessity of grasping those subjects which will keep the mind pure and unspotted. If we, as members representing the various Horticultural Societies of this Province, would use every effort to have this subject grafted thoroughly into the young minds, we shall accomplish something at least that will in after years bring forth fruit to the honor of, not only the Association in particular, but to the Dominion in general.

Mr. Whitney: I think a discussion of the rose for amateurs would be incomplete without speaking of the insect enemies of the rose.

Mr. Jackson: There is no doubt that the insects are a tremendous pest to rose growers. I think I have hit upon a solution that destroys them. Take whale-oil soap, make a strong solution of it, and get the extract of tobacco, buying it in pint bottles. Use that in about 20 parts of whale-oil soap to one part of the extract of tobacco, and apply it with an atomizer, such as the Evans of Hamilton, and you will get rid of

your pests. I tried kerosene emulsion in the first place, but found it very difficult to make an emulsion that would not be injurious to the foliage.

Mr. Whyte: How much water do you use with that?

Mr. Jackson: If you take a pint of whale-oil soap to about three or four gallons of water you will have a fairly good proportion. Then, of course, this is for the aphis or the insects that suck. You must understand that there are two pests which interfere with the rose growing; the first is the insect that sucks, the next is the insect that eats. There must be two remedies, one that will suffocate or choke the breathing pores of the insect, and the other that will destroy it, that will go into its stomach.

Prof. Saunders: What do you mean by the extract of tobacco?

Mr. Jackson: Fluid extract of tobacco. Any nurseryman will supply it in pint or half-pint bottles. Three or four gallons of water to a pint of soap, and then add your tobacco in those quantities.

Prof. Saunders: Have you tried the Madame Joly rose, one of the Hybrid Perpetuals? We have found that particularly valuable at Ottawa. We planted three of those plants in that very dry climate eight or nine years ago, and there are still three healthy plants living, and we cannot say that of any other variety we have tested. It is a very free bloomer. I would like to ask what winter protection you give your roses?

Mr. Jackson: So far as the hybrid perpetuals are concerned, I give them but very little, with the exception of banking up around the roots, and to do that in the first place I get good rotted manure in the fall of the year and then I gather up all the leaves, maple leaves in particular, and throw them around them. So far as the top is concerned, I do nothing with them. Hybrid teas will be better for a little thatch. The tea roses I protect with a nail case, and knock out top and bottom, and just form the cases, then I insert a stick right through the centre of the bush and bind the bush to the stick. The stick stands out of the top of the barrel from 8 to 19 inches. That forms a centre pole just as in a military tent; then I take a piece of canvas, or anything of that kind, and spread it all around the barrel, putting in a few dry leaves in the barrel first. In that way I think you will get all the protection that is necessary. I think there is a mistaken idea among people in regard to the rose being killed by frost. If roses that are covered up slightly are allowed to remain until all appearance of frost is gone you will get away with that trouble. I have known scores of beautiful roses destroyed simply because they were uncovered too early in the spring. It is not the extreme frost in the winter that kills the rose so much as freezing and thawing in the spring of the year.

Prof. Saunders: I think if Mr. Jackson would come down and live with me at Ottawa for three or four years he would find this question of protection a very serious matter. We have never been able to carry the tea roses through the winter, and the hybrid teas are killed out and the hybrid perpetuals are killed out continually in Manitoba and the Territories. We have not found a hybrid perpetual or a hybrid tea rose that has been able to live more than two seasons in either of those localities. We have tried a covering with earth and a covering with leaves; and as far as the cover goes the rose is usually protected, but the parts that are above that covering with earth and leaves are usually killed back. We find it best also to do our pruning in the spring when we see what the result of the winter is; but last winter I tried an experiment which pleased me very much in its results. It was not original with me; I got the idea from another rose grower in Ottawa. We took some plank 16 feet long and 1 foot wide, and nailed the pieces together, making ends, and set that down; that would cover a space of six or eight roses; then nails were driven about 4 inches below the top, pointing downwards inside, so that we could point the canes down inside and catch them in those nails. Then the boxes were filled up loosely with dry leaves, and we had the most magnificent show of roses this last year that we ever had in Ottawa, mainly on the bushes so protected. I am trying it again this year, varying the material, using spruce in some and leaves in others, and in other cases without any covering at all, using the still air as a non-conductor. I think the protection of those valued plants during the winter is one of the most important questions to the growers. It is very

disappointing when you get a bed of roses to find in the spring that they have all been winter-killed.

Mr. Jackson : In regard to tea roses I suppose they are the most disappointing roses that are grown. I have just about fifteen that I have wintered out for five years in my garden, and they have been magnificent with me, and all that I have done with them is just as indicated with the barrel, place a few dry leaves around it and form a cover at the top that will keep thoroughly dry. With regard to the hybrid perpetuals, if I was going to cover them at all I would merely take a stake, fasten the bush to the stake and lay a little rye straw, because it is longer than wheat or oats, and take three or four cords, and bind it round to make a thatch. That will keep it dry ; it will shed the water, and if you do that with your hybrid perpetuals I think you will find it will stand as far north as Ottawa. Mr. Race of Mitchell, has lived farther north than myself. I am merely giving you what I have presented after 25 years' of experience.

Mr. Race : Mr. Jackson was rather in error. He said I lived farther north than Port Hope. Our meridian line at Mitchell is somewhat south of Port Hope, although I am farther west than this. I know the conditions at both places and the soil and all the atmospheric difficulties, and I am rather surprised at the list that our friend has given us here. My object in presenting this subject before the public is to encourage the growth of roses, and I always make it as easy as possible, and avoid as far as I can any difficulties or disappointments. If you want to start a person growing roses you want to be sure that you have given them a selection of roses that will grow easily and bloom well, and a rose that will not be very much trouble in its cultivation. If you do that they will have such a return as to give them pleasure, and then they will go on to further experiment ; but if you give them a list of roses that are delicate, and that will only throw you out perhaps two or three blooms, no matter how much time is spent upon it, they become discouraged, and then their cultivation of the rose is very short. I realize that Mr. Jackson is now just where I was a few years ago ; he is just as enthusiastic as I was—I used to call myself the rose crank—there are a number of those roses that he has mentioned now that are only fit for cranks—(laughter)—because a crank in the rose line would buy a rose, care for it and cultivate it all through the seasons, for the sake of a couple of very beautiful perfect blooms; but you do not want to recommend such a rose to everybody, because they would not be satisfied with it. Take Margaret Dickson, a beautiful, charming rose; I would never recommend that to any person starting in the rose line, because I never think of protecting my roses during the winter without covering every one of them. I have some four or five hundred bushes, and you will see it is quite a task to cover all those roses, yet I find it necessary even up there, although our climate is not as severe as it is in Port Hope. I cover them with maple leaves and bend them down. I never think of pruning a rose in the fall ; leave the branches the full length, and my roses grow 9 or 10 or 12 feet high. I keep my ground immensely rich, and they are very easy then to bend down, and I cover them with straw or maple leaves. As to my method of protecting them from insects, last year the Hon. Mr. Dryden came into my lawn just before the blooming season, and he was surprised to see my foliage looking so clean and fresh, and he asked me what I had done to get this effect, and I said, "I have done nothing," and he said, "Surely you do not mean to say that you have given them no treatment ?" I replied, "I have really done nothing up to this time." He replied that he had never seen foliage in a rose plot at that season looking so fresh as mine was. I said, "I get my ground so strong that it is almost able to fight against the ravages of the insects," although that is not a good principle to act upon always, and the only thing that I ever have to do with the roses in later years is just to give them a slight sprinkling with the Paris green water. I like to make the treatment just as simple as I can, so that the amateur will not find difficulty and think there is too much trouble with the rose. Just as soon as you see the slug coming on—because that is really the most troublesome of all, it spoils the foliage, and a rose plant with the foliage spoiled is spoiled altogether, for there is as much beauty in the foliage as in the bloom—give them a slight spraying of Paris green water. There is also that little worm or caterpillar that eats into the bud

that comes on about the same time ; the Paris green water will treat that. As for the little thrip that gets in earlier under the leaf, I merely use common soap suds. This treatment, recommended by Mr. Jackson, is very good if you wish to go to that expense, but just take common suds and spray underneath it with a good deal of force and you will dash them all off, and by two or three sprayings of that kind you will get them clean of thrip.

Mayor Huycke : I wish to ask, on behalf of a lady, what kind of Rambler Roses are profitable varieties ?

Mr. Race : There is beauty in the full Rambler, but the trouble is there is no fragrance to a Rambler Rose. Queen of the Prairies is a beautiful rose, but it has no fragrance at all, and it is very much subject to that little thrip, and it requires a good deal of attention by spraying, and I use soap suds only on that. You have to force the suds on the end part of the leaf. That is about the only rose that I would recommend as a full climber, but the semi-climber is a very much more satisfactory rose. If you want a half climber take Victor Verdier. The Victor Verdier is a magnificent bloomer, and it is a preferable rose to its parent Victor Verdier hybrid, because it has some fragrance. The bloom is a nice pink, just about as near the rose color as you can get it. These are the only two climbing roses that I would recommend.

Prof. Saunders : What about the Crimson Rambler ?

Mr. Race : There is a family of Ramblers—the Crimson, the White, the Pink and the Yellow. Of these the Crimson is the choicest. It is a good, strong grower. It requires to be laid down in good time. It is very easily laid down and very easily brought through with just a little covering, and it grows so rank it throws out a very heavy bloom. Of course the blooms are not very large, but they grow in such thick and heavy clusters that from a distance it is most magnificent, but not so pretty when you get close to it. Among these Ramblers the Crimson is the most beautiful. If you want a second one you better take the Pink, although the flower is still smaller, but the White and the Yellow are really not satisfactory with us.

Mr. Beall : You do not mention the Baltimore Belle ?

Mr. Race : The Baltimore Belle is a climbing rose, and I used to have some seven or eight of them. Some years ago I threw it into the wood pile, and have not one about my place now. It belongs to the cranks now. I would rather have something where I would get much more satisfactory bloom. Do you prize it ?

Mr. Beall : I do prize it very highly. I find no difficulty in getting as many blooms as we should expect on a rose, and we find the branches will grow perhaps ten or twelve feet in a year, and we get hundreds of roses off a bush. We have several of them, and they all do well.

Mr. Race : I can get lots of bloom from the Baltimore Belle.

Mr. Beall : Certainly there is no prettier rose, and the perfume is all you can desire.

Mr. Race : It is a very nice rose for those who like it. I prefer the semi-climbers.

ORGANIZED EFFORT IN THE FRUIT EXHIBIT FOR THE LOUISIANA PURCHASE EXPOSITION AT ST. LOUIS, 1903.

By Harold Jones, Maitland.

Now is the time when we, as an Association, should make the necessary arrangements to have a telling and effective display of fruit at St. Louis in 1903.

What we need is organized effort to gather the very best our Province can produce, and this cannot be done by any one man alone without co-workers and systematic effort.

In our recent experience at Buffalo we find that, although all credit is due to our friend Mr. Bunting for his untiring and energetic work, he was handicapped from lack of system, and had to depend largely upon receipts of fruit in a haphazard and uncertain way.

When visiting our fruit exhibit at Buffalo after leaving the Industrial at Toronto, I was struck by the inferior quality of many samples on the tables; they could not compare with what I had just left at Toronto, particularly in apples. There were such poor samples in some varieties that I asked Mr. Bunting why he put them on the tables at all, and he said, "What can I do? This fruit comes to me, and if I do not put it up probably in a day or two some one will come along, and, looking around, will ask, 'Where are So and So's apples, you know he sent some?' and if I told him they were not good enough to show he would go home mad, and probably noise it abroad through his neighborhood, and I would receive no more fruit from that section."

Now in exhibiting and competing against the American continent we cannot afford to show anything but our very best. We can grow the finest of fruits, but we have close competitors, and cider apples will cut no figure in the race.

Now we have not got the time at our disposal at this meeting to take the matter up in detail, but I will ask the meeting to give it a short time for discussion, and appoint a committee to go thoroughly into the matter and have everything in readiness when the time comes for collecting the fruit.

I feel sure our Government will aid us in the comparatively small funds necessary for the work, and it can do so feeling assured that our Association will do the work well and make it a credit to our Province and country, and knowing that the exhibition with a Federal grant of $15,000,000 will probably be the largest ever held in the world, and will attract visitors from all quarters of the globe.

Now in appointing your committee suggest to them that they select men for the work from those sections where special fruits grow to special excellence—men who are themselves good judges of special varieties, and whose duty it will be to collect the samples and properly pack them and forward direct.

In that way the Superintendent at the Exhibition will know just to who he is to look to for his fruit, and can regulate the quantity coming in, and if not up to the standard, or with any other faults, he can write plainly on the subject without fear of hurting anyone's feelings. I hope that you will spare time for discussion on this subject, so that we can get the views of the many practical fruit growers here to-day.

SOME NOTES ON SPRAYING.

By J. E. Orr, Fruitland.

One would suppose that the subject of spraying had been thoroughly threshed out and its utility so amply demonstrated from such a sound and logical basis that we might almost allow the matter to rest, feeling assured that every one who attempts to grow fruit would recognize its advantages and incorporate them into their system of orcharding.

The Department of Agriculture has been put to much pains and expense to demonstrate the advantages and encourage the practice of spraying, but still there are many to be found who do not believe in it, who are indifferent to it, or who do it in a half-hearted way.

Some years ago I had addressed a farmers' institute meeting about ten miles from Cobourg, and was saying good-bye to the local clergyman. He said, "Good-bye, Mr. Orr. I suppose now that you have told the people how to attend to their orchards properly they will go right on and do it in the same old way." My reply was, "Yes, sir, just as they do when you preach to them." We find it necessary to have the clergy address us fifty-two times a year on spiritual matters, which we all allow to be of supreme importance, and still many do not accept the teachings of Christianity. And it would appear in temporal things that it is also necessary to have new theories and new ideas frequently and persistently presented to secure their general adoption. Institute

and horticultural speakers must expect that some of the seed will fall by the wayside, some on stony ground and some among thorns, and be satisfied if, occasionally, they can drop some seed into good ground.

Spraying is only one of many ways of protecting plants from the ravages of insects and fungi. The reason why it recommends itself to us is because it is the easiest, most effective and also the cheapest method. It is not a panacea for all the ills that plants are heir to, neither is any one formula applicable for all purposes. It is not necessary to go into the A, B, C of spraying at a meeting of this Association, and I only wish to call attention to a few of the principal causes of failure to obtain results.

In the first place, it is necessary that the remedies should be applied intelligently; that the orchardist should be able to diagnose the disease. A doctor who prescribes for a patient without this knowledge is called a quack. There are lots of quack tree doctors. There are some who, after having seen a few demonstrations of spraying, imagine that they are authorities upon the subject, and able to teach it to others. We find it very different after sixteen or seventeen years of practical experience. I find there is much about it that is not quite understood. As Prof. Roberts very aptly puts it, "You must examine the sickly plant, question it, ask it, 'What's the matter with you, anyway ? Are you sick ? Are you hungry ? Are you thirsty ? Are you lousy, and what kind of lice have you got ?' And when you have received a reply, you will then be in a position to apply a remedy in an intelligent manner. Here is where many people fail at the outset. Some have found a formula unsuited for the purpose for which they applied it, and have rejected it for all purposes. Thus I have found people who tabooed the practice of spraying because they had tried Paris green on aphidae, of course without result, proving Pope's contention. 'A little learning is a dangerous thing.'"

Again, many do not spray the trees at all, but simply drench them, in which case the particles of fungicide which are suspended in the water are mostly flushed off the leaf. If you will examine a plant which has been treated in this manner, after it has dried, you will find the larger portion of the leaf clean, and just at its point, where the drip has been, quite a deposit of the particles. To secure results, it is absolutely necessary that the mixture be applied in such a fine spray that it will rest upon the plant as dew. If the application is carried beyond this point, not only is the excess of material wasted, but it seriously discounts the value of the whole operation.

Again, many fail to secure the maximum results by not applying the remedies at the proper time. No dates can be given, as the seasons vary so widely. The calendar in common use, and the one we have always adopted with success with the Bordeaux mixture is :—

1st spraying, when the buds are swelling.
2nd spraying, just before the blossoms open.
3rd spraying, just after the blossoms have fallen.

Subsequent sprayings at intervals of from 10 to 12 days, if found necessary. By this I mean that a close watch should be kept on the fruit and foliage, and upon the first appearance of those olive-green spots, which are the first indication of the growth of the scab, or if any insect is making headway, we would apply the extra application. Here again is where the faculty of observation comes into play. Major-General Baden-Powell says in his little book "Aids to Scouting," "One pair of trained eyes are worth a dozen pairs of untrained eyes." And it is as true of the fruit grower as it is of the scout. He must be an observer. You may have noticed an article, recently published, by Prof. T. J. Burrill of the Department of Agriculture of the University of Illinois, who has announced that the parasitic fungus, usually called apple scab, does not winter as supposed on the twigs of the tree, and, therefore, cannot be killed by spraying before the buds open. This is deemed a very important matter in practical orchard management, for sucess hinges upon its destruction and is dependent on a knowledge of its life history. For best results the first application of the fungicide (usually Bordeaux mixture) should be made just after the buds open."

If this be correct, our first application has been somewhat too early. We shall watch further results with much interest.

One of the most prolific causes of failure is probably in the preparation of the Bordeaux mixture itself. Just what chemical and mass action takes place in the spray barrel is indeed a vexed question. Some have advanced the idea that the lime is added to neutralize the corrosive effect of any free sulphuric acid. If this were the case, we should have a soluble copper salts and a precipitate of lime. But such is not the case. I have seen Bordeaux mixture, to which an excess of lime had been added, where almost every particle of the copper salts had been thrown down in a very coarse precipitate, and, when the clear fluid was tested with ammonia, it would give a scarcely perceptible tinge of blue. It would, however, give a strong reaction when tested for sulphate of lime. Of course, this clear fluid was of no value as a fungicide, the beneficial properties all being in the sediment. Even in the solution properly made a reaction takes place which probably gives cupric hydrate and sulphate of lime, but in an exceedingly fine form.

Many people complain that their mixture is "curdy" and, in some cases, they can hardly work it through the pump. In such cases I have always found that they were in the habit of using an excess of lime and of bringing together the concentrated solutions and afterwards filling the barrel with water, instead of adding them one at a time to the barrel of water. Why this should make a difference I will leave for you to investigate, but it is a fact that by mixing the concentrated solutions you get a heavy, coarse precipitate, which it is almost impossible to keep in suspension and which is difficult to work, while, by bringing them together in a very diluted form it will precipitate very slowly, and have the appearance of a homogeneous mass.

If you wish to see an illustration of just what takes place when the concentrated solutions are mixed, bring together a small quantity in a wine glass. In less than a minute it will form so solid a mass that you can turn the glass upside down without spilling any.

It is well to have the copper sulphate and lime properly balanced. Bring each barrel just to the point where the ferrocyanide of potassium test will not reach and, if you have mixed it as directed, you will have a mixture which you can handle without difficulty and which will act quickly.

Some claim that in continued wet weather Bordeaux mixture so evenly balanced breaks down too quickly and burns the foliage; they think it better to add more lime as an equation of safety. However, we have never found this difficulty and prefer the mixture to be just balanced.

Mr. Caston: Have you or anybody else succeeded in getting Flemish Beauty pears absolutely clean?

Mr. Orr: I think we have, and Mr. E. D. Smith will tell you that we have about as nice Flemish Beauty pears as he ever saw.

Mr. E. D. Smith: Yes, that is right.

Mr. Tweddle: Yes, that is right. I live next door to them, and I see them every day.

Mr. Sherrington: Flemish Beauty pears were clean this year without spraying.

Mr. Whitney: Did you ever use bi-carbonate of soda instead of lime?

Mr. Orr: No, sir.

Mr. Whitney: A very successful fruit grower in my vicinity does.

Mr. Shepherd: Does Mr. Caston say it is impossible to keep Fameuse apples clean?

Mr. Caston: I did not say it was impossible. I said I had not succeeded in getting them entirely clean.

Mr. Shepherd: Keep on spraying.

Mr. Caston: I have done it for a good many years.

Mr. Shepherd: I have seen wonderful effects on the Lower Lachine road, where I buy the right to pick up apples. There is one orchard divided by a cedar hedge in the middle, and that man had about 50 Fameuse trees in his orchard about 20 years of

age, just in their prime. He had sprayed the first half all right, but he had not sprayed beyond the hedge, and when my pickers were there they could not pick one case when they got beyond the hedge; they had packed 150 cases in the first part.

Mr. Caston: One thing that has a great effect is the location of the ground where the trees stand. If you get trees well trained and open to the circulation of air and on rolling ground, and take others on flat land where there is not a free circulation of air, there is a vast difference, apart from the question of spraying altogether. I would not say one word against spraying. I would say to everybody spray and keep at it persistently; but I say I have not been able to keep them entirely clean. In some seasons we have the Flemish Beauty fairly clean, but in others we cannot get them clean by spraying in this way. I find where the ferro cyanide had been kept for a year in a closely corked bottle I could not get enough lime to prevent it still showing color when added to the mixture; a person might be led astray in that way as to the strength of the mixture. The bulletins that are issued by the United States Department, as well as those in this country, say, "Use the ferro cyanide test, and then when that shows it to be right, it is perfectly safe to use it on the foliage of plums and everything else, but add a little more lime to have it perfectly safe."

Mr. McNeill: Have you found spraying a perfectly satisfactory remedy for plum rot?

Mr. Orr: I would not say perfectly satisfactory. I think it has reduced it in some places very largely.

Mr. McNeill: I have here the names of Mr. Berton Mavor, Mr. Sutherland and Dr. Haanel of Collingwood, and two or three others here, large plum growers, who tell me that they have sprayed persistently this year, and have scarcely been able to see the results of their labors. I think probably your explanation will be quite appropriate here. I have no idea that we must give up spraying, but it does not appear that the practical plum-growers are finding it altogether satisfactory.

Mr. Orr: We grow a great many plums. Of course we cannot control it entirely, still we have found that our orchards are a great deal better than those of our neighbors who do not spray. Of course as a protection against that, all the mummies are removed in the fall from the trees. Prof. Hutt suggests that I should show you these two mixtures. They were both shaken up a few minutes ago, and you will see how the one has precipitated, and how the other has held up. These were mixed on Monday.

Mr. Tweddle: I live next to Mr. Orr, and pass his Flemish Beauty pears right on the front by the road nearly every day, and I must say that they were perfectly free from scab, all of proper size and perfect in every way. His trees are on red clay, rolling to the front. I only have two or three trees at the back, at the foot of the mountain on the washed soil, where we have more difficulty with plum rot, and we had no scab in that location; and I am perfectly satisfied from experience that if we get the Bordeaux mixture on properly, as Mr. Orr has said, that all the other conditions will yield to it, and we will get the result.

The Secretary: It is only fair to say that as far as I know the Flemish Beauty trees in that section that were not sprayed were totally unfit for market. I have a great many of them on my fruit farm, and those that were not sprayed were totally worthless this year.

Prof. Hutt: I think that this is a very important thing Mr. Orr has brought out, the difference in those two mixtures. I have met many fruit-growers throughout the Province this summer who had this same difficulty in making their mixture. They make the mistake in bringing together the two substances; if they had brought them together in diluted form they would have got their Bordeaux mixture to stand it, as shown in these bottles. I remember a few years ago at one of our annual meetings our President, Mr. Orr, declared he could not keep his Flemish Beauty pears free from scab, but those were the days when they had not spraying down to the science that they have it at present. I am glad now to know that he has had success, and is now one of the strongest advocates we have of spraying. I believe he is a strong convert to spray-

ing, and I know at first he was the other way, quite opposed to it, or at least said he had not got the results from it. I believe Mr. Caston will find that where spraying is followed up persistently the cumulative results will come out in time. You cannot do the whole thing in one season, but the results are cumulative. You get them fairly cleaned one year, and you keep right on, and the men who are spraying persistently get the best results.

The President: Every one who knows the Flemish Beauty tree knows that it has a beautiful green foliage. That is all that saved our trees from being cut down, for a good many years. We were not getting one specimen off them that was fit to send to market, and we were getting discouraged, and now we have no trouble whatever. We have had beautiful crops on these trees for the last four or five years.

Mr. Jones: How many sprayings do you give?

The President: I think they were sprayed three times this season.

Mr. Caston: What is the most important one?

The President: I cannot tell you that. If there is any sign of spots appearing on the foliage or on the fruit spray at once. If you do not see it there is no need of it.

Mr. Caston: The entomologist quoted by Mr. Orr from the "Horticulturist" says that the spores of this disease do not live on the trees, therefore there is no need of spraying on the tree. Where do they live?

Prof. Saunders: I think that is one of the few things that we do not know yet.

M. Pettit: There is another point that has not been brought out in regard to Mr. Orr's Flemish Beauty pears being so clean. I was up there visiting his place this year and while my pears, which had been fairly well sprayed, were almost a total failure, I found that his were clean, but his trees had been very thoroughly pruned, thinned out very much, much more so than the pear trees that you usually see in any orchard, and I think that that had a great deal to do with it as well.

Mr. Whitney: Do you spray twice before the bloom?

Mr. Orr: Yes, we have been in the practice of spraying just before the blossoms open, for the second time; the first time, any time prior to the buds bursting.

Mr. Caston: Would you recommend using the full Bordeaux mixture on the trees just before the buds are going to swell, or would you recommend the formula of two pounds to the forty gallons, or double that and make it four pounds to the forty gallons on the bare tree, without the lime?

Mr. Orr: We always use the lime with it. It will adhere to the tree apparently very much better when you put lime with it. When it goes on to the tree in the form of sulphate of copper it is soluble, and will brush off very easily; in the other case it will stick on.

Mr. Tweddle: Another wonderful result Mr. Orr reached was in cherries. Nearly every one rotted down in our district. Mr. Orr tells us he sprayed twice, and I could not see a single rotten cherry on all his trees. He sent them over to the Pan-American and swept everything clean.

Mr. Jones: In regard to the Snow apples, I find no more difficulty this year than usual in keeping the spot off that variety, and if anything it was worse than usual in our section in orchards that were not sprayed. This year, on account of the wet weather and the difficulty in getting into the orchards, I only gave four sprayings, where I usually give six. The orchard is very much sheltered by a heavy avenue of maples, and the trees have been planted 20 or 21 years, and they are only 25 feet apart, so that they are almost touching in the row, and still with only four sprayings I had between eighty and ninety per cent. of apples entirely free from spot, and they classed nearly eighty per cent. first-class when they were placed in the barrel; so that shows it is not necessary to get on the top of the hill or have your trees very far apart, or open to the fresh air to get the clean fruit.

Mr. Tweddle: I had one instance this year where I sprayed an orchard which had been spraying two years. The gentleman had another orchard on his place about 40 rods from it with the same varieties on it, Spys, and while the Spys in the sprayed orchard packed about 75 per cent. clean of everything, over in his own orchard we did

not pack anything at all. I bought his orchard, but could not get any No. 1 Spys. They were all scabby.

A Delegate: I would like to ask what variety of cherries those were, sweet or sour?

Mr. Orr: Both sweet and sour. The sour cherries that were sent were Early Richmond and Montmorency, and the sweet cherries the Governor Wood, Windsor, Black Tartarian, Alexander, Cleveland and some other varieties.

Mr. Bunting: I want to say, in corroboration of what Mr. Tweddle has said in reference to the President's cherries, that while we all know the extreme scarcity of cherries in our district this year, so that it was almost impossible to secure specimens for exhibition in Buffalo, the samples that came from Mr. Orr's farm almost daily were without exception the finest samples, I think, I ever saw, and I do not think we found one decayed specimen at any time while they were at Buffalo, and they remained in an excellent condition for quite a length of time. I think the same thing would apply to the specimens that were received from him during the summer.

Prof. Macoun: We should not under-value this discovery of Prof. Burrill. There is no doubt that the greater number of sprayings we can give the trees while they are growing the better, and by his discovery we find it is not necessary to spray while the trees are dormant, so we can give the first spraying just as the leaves are beginning to develop. In this way we can perhaps get in one more spraying, because that comes at an earlier season of the year, and we can get in the second spraying earlier; but the point I wanted to ask was this, that we do not know when we may be troubled with the infestation of the tent caterpillar and the forest caterpillar again. I have found at the Experimental Farm that these caterpillars hatched just as the leaf buds are breaking, and the leaf buds expand from the 28th April to the 1st May.

The President: We have the dates at home, and it is the 8th to the 28th April.

Prof. Macoun: There should not be any special time—just when the buds are breaking, but if you can do it within a week or so of the time that the caterpillars hatch, you know when they are quarter or half grown they are much more difficult to fight. We find that by spraying just when they are hatching we clean them all out; and by regulating your first spraying so that you can do it justice by that time, I think you will find no difficulty with the caterpillars. You must use Paris green with all your sprayings.

ELECTION OF OFFICERS.

The election of officers was then proceeded with, and much interest was evinced in the result of the polling. The report of the Nominating Committee was finally amended by the substitution of the name of Mr. Snelgrove for that of Mr. Rickard as Director for District No. 5. The list of officers is given at the beginning of this report.

HORTICULTURAL SOCIETIES; THEIR RELATION TO THE HOME, SCHOOL AND PROVINCE.

By G. C. Creelman, Superintendent of Farmers' Institutes, Toronto.

The subject assigned me is one in which I am intensely interested—the subject of horticulture in its broadest sense, as it affects our home, our schools and our country. We have in the Province of Ontario farmers' Institutes controlled by local officers in every district. Up to a year ago we had growing up in our farmers' institute meetings a tendency, especially among the young people, to want what they called better entertainment at the evening meetings. We found a growing demand for public speakers; we found we had to have special attractions at our meetings in order to keep the young people quiet and bring them out to our meetings in the first place, and in some instances they even introduced such things as the Kickapoo Indians as a special attraction at the evening meetings for those who craved that sort of thing. I found,

on the other hand, that it was very hard to get practical farmers to address institute meetings in the evenings; that men who were entirely suitable for the evening meetings found it hard to be sandwiched in between the Kickapoo Indians and the comic singer; and that when the most practical farmer got up to give a talk on the commercial fertilizers, or strawberries, or even floriculture, the young people simply bore with him until he got through, and it was discrediting some of our institute work. Down in the Township of Saltfleet, in the Hamilton and Grimsby district, that has been celebrated for so many things, we found that the women on the farms had begun to realize that they were a factor in the development of home life on the farm, and they made a demand that they have some women's institutes, and in Saltfleet Township was established the first Woman's Institute. (Applause.) Now, I saw that that would be a practical scheme to help out the evening meetings in the farmers' institute and do away with this special entertainment, and by encouraging the women of the different counties of the Province we have now 35 active women's institutes in Ontario, with an attendance during the past year of over 6,000 and an active membership of 1602 women. At these meetings they are discussing floricultural subjects, horticultural subjects generally, bee keeping, the production of poultry, dairying subjects, home dairying, particularly how to improve the quality of our butter in our home dairy, and the troubles and trials they are having in their own home. They find out that one woman in the country has a particular reputation for making a special quality of butter, and they get that lady to invite them to hold their meeting in her dairy, and they find out how much salt she puts in her butter, and how she has been getting a cent or two a pound for her butter more than other people do. So we found that many who came to these meetings to scoff remained to pray, and a great deal of good has been done for the farm home by the women's institutes.

In life the useful and the beautiful seem to stand in opposite relation to one another. The first thought of a man in his life work is utility; later on he adds to this the beautiful. Elias Howe, a poor old cripple, sits watching his wife trying to make a scanty living with her needle, and as he sees her work his one thought is, "How can I ease her burdens?" In his brain is finally evolved a sewing machine. The useful being uppermost in his thoughts, his first machine was rough and crude; no thought of the beautiful filled his mind, but only the thought of the useful. It afterwards entered the minds of men to make the machine more beautiful, and now we have them in all shapes and sizes and encased in cabinets, boxes and desks. Robert Fulton had not our beautiful palace steamboat in his mind when he built his steamboat on the Hudson; his only thought was to make a craft that would run against weather and tide, and his rude, cumbersome, awkward, yet useful boat, would not now be recognized alongside of our modern vessels. In the realm of thought and knowledge the useful is the first and afterwards beauty is added, and beauty and knowledge then go hand in hand, and as the nation increases in knowledge and learning you see her people increase with the useful and the beautiful, and utility plus beauty becomes one of the facts which determine in our minds "the civilization of a people."

Take the history of our own people: at first we had the rude log houses and cabins, built by our forefathers with the idea of usefulness. As they grow old and another generation succeeded them the thought of the beautiful entered with the useful and we find some of them building anew, while at the same time others could not get the idea of the beautiful in their minds, and moved their location farther back into the woods where they required only to think of the useful. Our forefathers had to work too hard with the axe and the plow to think much of how things looked. Now, the axe and the ploughs must be painted and made attractive before the farmer will think of taking them from the shop.

The fishermen on the sea of Galilee fished with home-made nets and lines, while to-day the sportsman goes forth with his silver mounted rod and artificial fly. Our fathers cut down the trees of the forest without thought of their beauty or their effect on the appearance of the landscape. To-day we are planting trees for the sole purpose of beautifying our home surroundings.

The Home. This brings me naturally to the first part of my subject "The Relation of Horticulture to the Home." In the matter of houses we find again a tendency in our older people to stick to the abode of their childhood, and to my mind there is not a more pitiful sight than to see an old couple on the farm, move from the house in which they have spent their happiest days, into the well-earned, commodious, brick ersidence which they have erected. Though they have now suites of rooms on two floors, a large, well-furnished parlor and sitting room, you will find too often that from long habit they content themselves with spending the last days of their life in the kitchen and bed room attached, leaving the rest of the house closed up, to be opened only when the minister calls or friends from the city come to spend the night. They have been used to an outdoor life, simply coming into the house to eat and sleep, and for these purposes few rooms were required.

In the city we find the other extreme. Land sells at so much per foot frontage and the house covers most of the lot. The house is therefore home and farm to the city people, and it is made as large as their means will allow. You who are here tonight, however, will note changes taking place in both the afore mentioned. The country home is being made more attractive in the new houses which are being built; the kitchens are more convenient; ranges and furnaces are replacing the stoves, and in many cases bath-rooms are being provided for in the plans. Many of our farmers now reserve a plot in front of the house to be left in grass and not a few have added lawn mowers to their stock of agricultural implements. Trees and shrubs are being planted solely for the purpose of improving the appearance of the place. New fences are taking the place of old ones and farmers are taking pride in the way their place looks from the outside. We also note a change in the towns and cities. Never before in the history of Toronto have so many verandahs been erected as during the past year. The high board fences that surround so many of our homes are being rapidly torn down; houses are being painted in brighter colors; and people are even taking down the small fences which separate their houses from the road. Here in this beautiful summer resort one would scarcely recognize the Cobourg of a dozen years ago. There never was a time when a knowledge of horticulture would prove so useful as at the present moment. It is a most laudable ambition that neighbor should vie with neighbor as to whose home should present the most attractive appearance, and it is the duty of our local Horticultural Societies to place within the reach of our townspeople all the information possible that will help them in attaining this end.

The School. Twelve years ago at the annual meeting of this Association in Hamilton, the following resolution was moved by your honored secretary and adopted:—

"Having in view the great importance of a more extended knowledge of horticulture in our country, this Association recommends to the Minister of Education the consideration of the wisdom of encouraging the study of horticulture in connection with our public and high schools, both by making it obligatory on first-class teachers after a certain length of time to take a short course of instruction at the Agricultural College, Guelph, and by making each school yard an arboretum of native trees and shrubs properly arranged and labeled."

Unfortunately the ideas conveyed in this resolution have not been carried out yet. Never before was there such agitation as at present for more practical instruction in our public schools. In this day of specialists we find that a boy or girl cannot afford to spend ten or fifteen years in the study of generalities. We know that a young man in business learns more in reference to that business in one year, than he would in his entire school career. In fact, many men tell me that in taking a young man or woman into their employ the first year is largely devoted to the overthrowing of theories and preconceived ideas. We feel that the people are justified in demanding more practical subjects such as manual training, the study of soils, of plants and of animals in our public school classes. What would you think if some one should suggest cutting down the grand old elm trees on the glebe land back of your Episcopal Church, or the maples in the eastern and western end of your town? And yet I doubt whether you ever stopped to think of or to thank the men who planted or preserved

those trees. Whoever they were, these men were practical horticulturists. Suppose the boys and girls of our schools had these things pointed out to them, and were told which trees were adapted to this climate, with the suggestion that they plant a tree at home so that in after years they could look with pride upon the town's improvement and say, "We had a hand in it." I doubt even whether the children know the commercial value of these things. No grown man, or even a normal boy, would think of striking a beautiful horse in the eye so as to spoil his sight, nor cutting off a cow's tail and so spoil the appearance of the animal, and yet even from the standpoint of dollars and cents, because of the ignorant way in which we have destroyed our forest growth, individual pine, basswood and elm trees are worth as much as our ordinary farm animals. We do not propose at this time to go into the relative ethical values of such practical study as compared with mathematics or classics, but we do say that our children should be instructed, or given the opportunity of finding out for themselves more about the living, growing things about them. The boy who spends his time after school hours in gathering plants and insects or breaking open rocks for fossils, is not the boy whom the merchant or banker complains of when he says that his apprentice has to "unlearn" what he was taught at school.

I am glad to see the agitation in this meeting towards more knowledge of what some call Nature Study. Some call it bulletins, some call it agricultural college expansion work—but call it what you like, there is a time, as there never was before in the history, for elementary treatises on our practical home questions. We see it in domestic science, which is a word that we knew nothing about in this country a few years ago, but which is now getting to be a common word in the language of every day. I remember when I was at the Agricultural College the talk about carbo-hydrates and nitrogeneous substances and albuminous substances seemed to me to be words written in a foreign language ; but now at the Farmers' Institute a farmer will rise up at the back and ask how much carbo-hydrate substance should be mixed with nitrogenous substance in order to make a balanced ration ; he does not say, how much "bran" and so on. These gentlemen that you have seen before you the last two days, who are leaders of horticulture in this Province, have been pounding away at that subject. They have been endeavouring through their municipalities, their individual schools and homes and home life to create a sentiment in the communities for a better understanding of the simple laws of horticulture by our children in our public schools. We have learned a good deal about animal life in our schools.

The Province. We have in this Province, according to the latest statistics, 312,787 acres of land in orchards, gardens and vineyards. In apples alone, we find that we have over nine millions of trees. These trees are producing on the average only about three bushels each. Supposing we could, through the Horticultural Societies by the study of insect pests, by improving our knowledge of the art of spraying, and by studying the best means of fertilizing and cultivating the soil, increase the yield of these apple trees one bushel each, what would we have accomplished ? This would give us three million barrels more apples, and at the rate of say $1 per barrel we have, without increasing our acreage at all, added to the value of our apple orchard three millions of dollars.

Then, again, we need to give more attention to the packing, grading and handling of the fruit. How long would you deal with your grocer if, when you ordered one dollar's worth of sugar he should send you up a mixture of granulated and three or four shades of brown ? And yet brown and granulated sugars both have their uses. So with our apples. When the fruit is graded, as has been repeatedly shown, not only is a better price received for the first grade, but also the second grade, if it be an even lot, is more valuable than the mixture. In the matter of packing also, attractiveness counts. I know one man in the Hamilton district who says he will never ship apples in a barrel again. He puts them all up in boxes with excelsior top and bottom and gets more money for them in this way. This is a feature of the work, then, in which our Horticultural Societies can help. It may be said that this commercial side of the work has nothing to do with the people of the towns and cities, but with this I do not agree. Our towns

in Ontario are prosperous just in proportion as the farmers surrounding them are prosperous, and the town which lies in the centre of a district surrounded by a rich deep soil, is the town which will make sure and rapid growth towards cityhood.

It is the duty, then, of our town organizations to co-operate with the farmers and gardeners who are producing the very foods that are necessary for our sustenance, if such towns are to reap the benefits of the farmers' prosperity.

In conclusion I would say that I have touched very lightly, if at all, upon the organization side of our work, but I would say that each Horticultural Society has an opportunity of doing for its members and the community at large a work as noble as that of any organization in existence in this Province to-day. Let us then as a people learn lessons of wisdom from this and kindred societies and from nature, and let us endeavor to learn those elements which tend to stability of government, the promotion of health and the present prosperity and happiness of our people. (Applause.)

POSSIBILITIES IN HORTICULTURE.

By C. C. James, Deputy Minister of Agriculture, Toronto.

Supposing I were able by some magical power to pile up on this table a glittering heap of golden nuggets, just such a pile as was to be seen at the Glasgow exhibition this year, and I would say to you, "This pile of gold has come from a certain country; would you not like to go and live in that country?" Your first inclination would be probably, "Why yes, any country that produces gold in that abundance must be a magnificent country to live in." That heap of gold was labelled "Yukon". Gold is a good thing to advertise a country, and it was used with magnificent effect to advertise Canada this year, but when we say that gold came from the Yukon, you can see that gold does not necessarily indicate a fine country to live in. We will take that gold away and pile up wheat on that table from one end to the other, and I say to you, "All this wheat has come from such and such a country, would you not like to live in that country?" You reply, "Why, yes, a country that would grow wheat like that must be a grand country to live in." Well, that wheat came from the treeless prairies of North America—away out on the boundless, solitary, treeless prairies. Perhaps it came from some of the rich prairie land of South America, or perhaps it came from some of those unattractive rich bottom lands of Russia. You come to the conclusion that a country may grow wheat to perfection but may not be an attractive place to live in. Now we take the wheat away, and bring here an assortment of fat bullocks and sheep. You look at them and say, "A country that produces those must be a rich country; surely that country must be a fine country to live in." Well, we say that these have come from some unheard of section of Australia, or perhaps from the Argentine Republic in South America; and you say, "A country may be able to produce magnificent animals like that, and yet be unattractive as a home." But in place of that we put before you just such an array as you have here to-night, and in addition to these magnificent looking apples we add peaches, and pears, and grapes, and flowers of all kinds. I think you will all admit at once that a country that will produce fruit so attractive in appearance, and so delicious in flavor, must be a grand country to live in no matter where it is. I think you will now see why our Government has felt it so important to put before the people of other countries, not simply our gold as an attraction, not simply our wheat, not simply our cattle and horses and sheep and swine, but they have felt it important first and foremost, to place before them the fruits of the country, knowing full well that the old saying, "By their fruits ye shall know them" has in this connection a significance that does not belong to gold, or wheat, or live stock. (Hear, hear.)

What I have said will, at the same time, indicate to you that a country that produces fruit such as we have here to-night has raised itself quite a bit above the level of a country which simply digs gold out of the ground, or a country which simply

produces wheat to feed the world, above the level of a country which has its great flocks and herds. A country that has a large and important class of fruit growers in its midst has already assumed a very high position as an agricultural or productive nation. And so, when you come in contact with the horticulture of this country, its fruit growing, you are coming in contact, not with the lower levels of our agricultural production, but with the higher levels ; and you have only to come in contact with a few of the men who are concerned in it to know that what I am saying is more than true. If you still have any doubts about it, I would simply say, attend the conventions of this Ontario Fruit Growers Association and all doubts will be dispelled. I will guarantee this, that you cannot find in the Province of Ontario any association of men in connection with our great city industries or in connection with our great professional lines, and will canvass more thoroughly the questions with which they are vitally concerned, or doing their work in their conventions more thoroughly than the Association that meets here to-day. This Association is very old. It is the oldest Association that we have in connection with the Ontario Department of Agriculture ; and for that reason we have always had a very warm spot for it in our heart. This Association is older than the Province of Ontario ; it began before the Province began, having been organized in the year 1859, and there is now sitting on this platform, an honorary member, the only one alive, I believe, of those men who first organized this Association, Mr. A. M. Smith, of St. Catharines. (Applause.) It has been a forerunner of other associations. After it, there came under the Government's wing the Entomological Society, and one after another of the Live Stock Associations, until now we have a large number.

What is going to be the effect of this Association upon Cobourg and its vicinity ? You have heard to-day speakers from as far east as the Ottawa Valley, and also from the Province of Quebec, and the gentleman who is to follow me comes from the garden of the Gulf of St. Lawrence. We have heard, also, men from the West and Niagara District, from the Georgian Bay, in fact the whole Province of Ontario is represented here, and these men who are among the very best in their work are here giving information to one another and getting information from one another. Unless some permanent results come from this meeting it will have been a great mistake, and the Association might far better have met somewhere else. Why does it move from place to place ? Simply that these various localities may get the benefit, that the persons resident at or near those localities may meet, and the benefits of this Association may be spread, over that section. Now, how can this Association be of benefit to this place ? You have in your midst a local Horticultural Society, and though it is active at present I suppose there are greater possibilities ahead of it ; and if this Association meeting stimulates the local organization to greater energy and more active life, it will not have met here in vain. Now what can that local Association do ? What is it doing? Is there any work yet to be done ? I suppose after all these questions largely resolve themselves into questions of dollars and cents. Upon what is the prosperity of Cobourg depending ? You have your local industries, and the local Horticultural Society has nothing to do with those. You have the locality round about. Mr. Creelman referred to the possibilities that would result from the improvement of our orchards throughout this Province. You have only to look at the orchards located within the confines of Northumberland and Durham to see what enormous possibilities there are right along that line. To narrow it right down to your own town, what can your local Horticultural Society do to improve your condition ? Well, I suppose from the standpoint of Cobourg being largely a summer residence place, the question of the local improvement in the appearance of this town may be said to have a first and very important place. I was wondering as I came in on the train what the impression is on a stranger coming into the Town of Cobourg. Now, you are peculiarly situated here ; every train going east and west stops at Cobourg ; you are not side-tracked like some other towns ; every person has to stop over here. The boats, going and coming, frequently bring passengers past your door ; and as I have come and gone I have wondered whether your local Horticultural Society could not develop into what is becoming a very popular movement on the other side.

namely a Local Improvement Society. If, for instance, strangers coming into the station could see there a very attractive bed of flowers and a few hanging baskets of flowers, etc., that alone would almost be enough to get some of them to stop off here. We have a few railway stations in Ontario that have been laid out in a particularly attractive manner, and you will hear people all over the country say, "Did you ever see the beautiful flowers at such and such a station ?" and so on, and I have wondered whether the local Horticultural Society could do something in that line, to attract the eye and the attention of the people coming and going ; to indicate to these people, who otherwise would be unaware of it, the fact that right here in Cobourg you have a large number of people who love flowers, who love a beautiful place, and have made of this town one of the most attractive spots in the Province of Ontario. Your lake front, also, can be very greatly improved. You have made a beginning in connection with your park, and it seems to me that the local Horticultural Society in its local improvement line could do a very, very important work so that those who come in from the south by water would have their attention attracted at once in that connection. Then suppose we could go throughout this town and remove all the unsightly fences—(hear, hear)—and introduce fresh grass along the streets and in front of the houses ; and then supposing we could go to the schools next spring and as every pupil passes out give him or her a small packet of seeds ; what would follow ? As I passed this summer through a number of old-fashioned English towns I looked at them and wondered just what was the attraction about those places—stone walls in most cases, old stone buildings, nothing attractive about them. There was an answer in front of every door ; there were flowers on every window sill, there was a little box of flowers, and even if the patch of green at the front door was not larger than the top of a table, there were flowers ; you could not get away from the flowers, and those little stone houses, some with thatched roofs and others with slate roofs, that otherwise would have been an eyesore and unattractive, simply because they were dressed in those gay flowers which cost very little money—they were not those expensive roses and other flowers that are rare and readily killed off—but simple old-fashioned English flowers; because of these flowers there was a charm and beauty in these little places. And I have often thought that if we could go up and down through the main street in this town, for instance, and see the windows filled with boxes of flowers, and if we could get away those old unsightly fences—they are going gradually, but perhaps they could be hurried—and have more grass, and if we could make attractive entrances to the town, if some work of that kind could be undertaken and pushed on and hurried along by your Horticultural Society, then it would certainly be living up to one of its objects, and would become indeed a local improvement society. And what would be the result ? What has been the result in these enterprising New England towns that have had those enterprising local improvement societies at work ? Hundreds of trees from year to year have been planted, the places have been beautified. The houses are not as good as ours—nothing but frame houses, but they receive their fresh coat of paint every year, and around the verandahs you will see the roses and other flowers climbing up. The place is open so that the public can get a good view, and it is like walking about a great park, and as you walk along you feel, "Well, I enjoy this place, and though I do not own those houses and the grounds, yet they belong to everybody and I seem to have a place here." Life under those circumstances seems to be worth living far more than in some other places where people pay no regard to appearances but put all the money on the insides of the houses. This is simply thrown out as a suggestion, and what I know is being gradually worked out in connection with your local Horticultural Society, and it seems to me that if this Provincial Association can only give the impetus to this work and attract attention to it so that there will be brought into this Association every resident in this town who thinks that life is worth living afer all, then this Association will not have met here in vain.

Just a word before closing in connection with horticulture as a business. I had an opportunity a short time ago of attending a meeting in the city of Toronto at which some addresses were made by some of the most successful business men and financiers of that city, and in addressing the young men to whom they were talking, one

after the other said, "Now, if you will only fit yourselves properly for the work you will have no difficulty in finding work to do. There are places in connection with our great businesses for well educated, well trained men;" and one man said, "There is not a great mercantile or financial institution in Toronto to-day that has not a place vacant somewhere near the top for a bright, enterprising young man if he is only capable of filling it." I had an opportunity shortly after that of addressing the same people, and I said, "You may think perhaps that what I have to say is not very appropriate, but where one place has been indicated by the gentlemen who have preceded me in connection with our financial and mercantile institutions, I can point you to an industry where there are twenty vacancies, and that is in agriculture and the various lines of work associated with agriculture. There is no work in this country that is reaching out and demanding young, well trained, well equipped men as is agriculture, in some of its various forms. There is nothing to-day that presents so wide and varied a field for work as does horticulture, for instance. We might start at the bottom and show you from the soil right up to the finished fruit and its preparation for market and its marketing, there is a demand upon the men who are going into it for a higher class of brains and of skill and industry than is demanded to-day by any other work that is being carried on in this Province of Ontario. There are certain lines of work that narrow a man, and a man has, to a certain extent, to make himself a machine; but the moment a man in connection with agriculture or horticulture makes a machine of himself he is doomed to failure. You cannot become to-day a succesful horticulturist if you make a machine of yourself. Back of all your work there must be that keen, active, energetic, wide-awake brain which will solve difficulties that will never present themselves along any other line. A perfect apple or plum or peach in large quantities of a saleable nature, just such as the world is asking for and is willing to pay for, demands a far higher class of ability than the production of nine-tenths of the articles that are coming out of our factories in our large cities. Thus horticulture is demanding to-day the best young men in this country, and our young men who are looking around for work should consider that here in this field there are openings without limit, and here is a field that will not only give them a good living if they are willing to work, but will give them scope for the development of their brains, here is a work that will bring them out in contact with nature, that will have a strong tendency towards the development of their social faculties as well, that will not make a machine, or a drudge, or a slave of a man. Here are opportunities for young men that are not to be found in any other calling in this Province. I would like to see a great many of the young men of our towns and cities who are to-day thinking of making doctors, lawyers, professional or business men of themselves—I would like to see a great many of those young men who are just on the threshold of life wondering what they are going to do—give a careful consideration to this question of horticulture as a pursuit for a bright and industrious young man. Do you want to see some of the ideal homes in this country? I would simply ask you to go to the fruit-growing regions of the Province of Ontario. Have you ever been around Burlington Bay and through the Niagara District? Have you ever been up around the shores of the Georgian Bay? Have you ever been down in the county of Prince Edward? I will not say that you will find there the wealthiest homes in the Province of Ontario to-day; I will not say that you will find there men who have nothing to do, and families that are living in luxury and at ease; but I will say this, that in some of those sections where fruit-growing is being made a specialty and where they are working along the best lines, you will find more social success, more home happiness, more true, genuine, home comforts on the average than anywhere else in the Province of Ontario, (Hear, hear). Now, if that is what you are after, a good living with a good time, accompanied of course by good earnest hard work, and work that is mental as well as physical, then I say that the horiculture that we have been talking about so much for the last two days presents a most attractive opening for the young men of this Province; and if we could only turn into agriculture and horticulture a good deal of the energy that is now going into our towns and cities, if a great many of the men who are bound to make millionaires of themselves, and have very little idea of what stress and discomfort is

ahead of them in that—if we could only turn a large number of these out into the country towards the fruit farms, and the dairy farms, and the live stock farms, and build up that part of our country, I would not give one moment's thought or consideration to the question of the building up of our towns or cities, because just as we can produce fruits like these, and butter and cheese that will satisfy the discriminating taste of the Old Country people, and just as we can supply beef and mutton and those other products on our farms in sufficient quantity, just as we can produce those in fair quantity, but of the highest quality, so will the success of this country be assured. It will not depend upon our gold mines, but upon just such things as you see here. A few apples may seem a very small thing, and this Association perhaps may not loom up as important as an Association of bankers or some other financiers, but if it were not for Associations of this kind there would be no necessity for Bankers' Associations ; and if it were not for the work of men such as are around this platform and that are all through this country, there would be no necessity for the great manufacturing establishments, there would be no great necessity for towns like Cobourg and other places. You will find as you go back that after all it is upon the apple barrel, and the cheese box, and the side of beef, that the true prosperity of this country is based. It is not a question of whether we are going to find more gold in the Yukon or not ; but if we can go on producing and improving our apples and the other products I have referred to, then we will be helping to develop that which is after all the true basis of the prosperity of this country.

The President : We are very glad that we have a gentleman from that Province down by the Sea, Prince Edward Island, who takes an active interest in horticultural matters, and I heartily wish that many others in his calling in life would do the same. I think that they would be better able to reach us on the Sabbath day ; I think they would get a little nearer the hearts of men if they knew a little more about horticulture than they do. The Rev. Father Burke of Prince Edward Island will address us on the general phases of Maritime Fruit Growing.

ADDRESS BY REV. FATHER BURKE, ALBERTON, P. E. I.

Rev. Father Burke was received with applause and said : I assure you it is with very great pleasure indeed that I came up here from the little Province of Prince Edward Island, not to teach you anything at all, or to say anything that will be specially instructive, but to look upon your pleasant intelligent faces, to mingle in your meetings that have given us such satisfaction and pleasure, and to go back to my own little Island, where we are in our babyhood in these things, and by some process of osmosis, as the doctors call it, to impart this knowledge which I gain here to my own people. I came from the smallest Province in this great Dominion, but so far as horticulture goes it is certainly in a position of reaping great benefits from these sciences, and I only hope that many of the people we have been listening to in these meetings will find time to come down and see us and contribute to the general information of our meetings, to help to uplift our community and speedily put us on in the way of progress such as agriculture and horticulture have taken upon themselves in this Province of Ontario. I must compliment you upon the success of these meetings. We have had very serious meetings indeed, and some serious subjects this evening, and I hope I will not make myself too serious. The President thinks that if the clergy mingled more in meetings such as are now taking place, the people would be better able to listen to us on Sundays. I did not come here to preach to you, and therefore make you feel unhappy immediately—(laughter)—my subject will not be found of that kind at all, but I will simply give you a little bit of the history of horticulture in our own country. Before doing that I wish to say I have been delighted with the reception that has been accorded me here, and delighted also with mingling with the people of Ontario, and finding that they are the best people that you could possibly meet with. (Hear, hear). It is well to rub shoulders sometimes, to know the people that comprise the population of the different provinces of the Dominion, and by that kind of intercommunication and intercourse we learn very much which we can impart to advantage to our own people. Now you think that these

meetings are of a mutual admiration society. It is true we all compliment one the other, and it is expected that an Irishman will be able to put the compliments on double thick. (Laughter).

It would be presumption in me to attempt to say anything to a community such as this on the subject of horticulture in the Maritime Provinces, therefore I will not go into the special phases of that question, but merely tell you that we are in our infancy in that regard, that we have been learning our lessons from the good mother society in Ontario. We like to get something from Ontario for nothing, because I am sorry to say that we have to give Ontario nearly all our resources, because we ourselves are not able to procure for ourselves the things which we stand in need of, and which Ontario produces in such quality and in such quantity. We are a purely agriculture community, a small island, as the late Governor Howlan, one of the greatest agriculturists, called it, "A million acre farm." We have a farm one end to the other. As one of the members of Parliament said, when one of our members was insisting on something, "Why, you could take it and let it splash in one of our lakes and you'd never hear the splash even." (Laughter). We are small, it is true, but at the same time we have our own interests. We are an agricultural community, and because we have no manufactures of our own we are obliged to receive from this great Province of Ontario nearly everything that we consume in that regard. Therefore if you look into the statistics of this country you will see that we are importing and consuming more per head than any other Province in this whole Dominion. That may be a good thing, or it may be a bad thing, but everybody will admit that it is at least a good thing for the people who are making money out of us. (Applause). Now there are some things that we are getting from you for which we are not giving very much. Only a few years ago, when agriculture took a different turn, which it has taken in this country, and for the better, that great friend of agriculture and of the general advancement of the country, Prof. Robertson, came down to us in Prince Edward Island, and by a co-operative movement among our farmers established cheese and butter factories. From having not one pound of either of these products, or perhaps a few scattered pounds of what was called "bad dairy butter," we have in the last ten years come to this, my friends, that we are receiving from those products of cheese and butter the round sum in that little Province of almost one million dollars. (Applause). This is a great result in those few years, but we have not yet quite discovered that we are in a position to receive almost that amount of money from the products of our orchards. Although we are small, we have provincial autonomy and all the paraphernalia of Parliament. One of our own Prime Ministers, who was not as patriotic as he ought to be, and who had his own prejudice deep-rooted—as people generally have, they say, the deeper in the smaller communities—stated openly in Parliament that it was useless for us to talk in Prince Edward Island about apples or fruit at all, that we never could grow apples. After that apples began to be produced, they began to be shown upon the tables of our exhibitions, and because our resources are small I am sorry to say we have not nearly as many of these exhibitions as we ought to have, but the fruit was shown and immediately set the people thinking. Strangers came there and said, "It is beautiful, looks well, at least externally, whatever it may be in the interior, as to the quality of the fruit that is produced." And when they examined that they found, strange to say, that we had as good apples as were being shown over in Nova Scotia, which already had a reputation for at least one quality of apples, Gravenstein; and as we were getting much fruit from Ontario, fruit was produced there that even compared with this Province. Then we commenced organization. I wrote here to my friend, Mr. Woolverton, and he immediately gave me all the information that was necessary—not only that, he met us more than half way in our demands, and helped us out with that information which his "Horticulturist" has given to us, and which is of such great benefit to all Canada. (Applause). Now we have a great deal to be thankful for. We are imitating this Association of Ontario so far as we possibly can. We found it easier to follow example than to obey the precepts that we get—nobody knows better about that than the preacher who has to preach on Sundays, and see, at least in many cases, that people do not live up to

the preaching that is given to them. We are trying to follow the example of the Fruit Growers' Association in Ontario, and they have set us a very good example indeed. We have been organizing and trying to hold meetings. We have had speakers from the Experimental Farm at Ottawa, who have given us instruction, and we have commenced to look to our orcharding, and have asked the Government to give us assistance, and we will get all we possibly can out of them, because they will get all they possibly can out of us. We find always a good friend in Prof. Robertson, and we have his assurance that some good men, likely from Ontario, will come down to us in Prince Edward Island, and if they are single people we will find for them down there one of the best looking girls whom they may take back with them to Ontario. (Applause). We have only a population of 120,000 people, our Island comprises only 2,000 square miles ; your Province is 111 times larger than ours, and therefore it would not be expected that we could get up institutions like you have. I am much pleased to see the enthusiasm you have thrown into your work here, and am glad to know that the report of your lectures and discussions here will go down to our people, and that many of them will receive valuable lessons from them, and I hope that as many of you as possible will come down and visit us. I am sure that in the summer months Cobourg is a delightful place, but people who have been down to my county will tell you that that is one of the beauty spots of the whole Dominion of Canada. (Applause.) Come down and we will take you to our hearts and extend to you that hospitality for which islanders, not only upon this side of the Atlantic, but on the other, too, are proverbial. There may be a little selfishness in my invitation, because if you come down we will likely have a little of your money, but as we give you a great deal for your manufactures you might give us a little bit of that which you spend so freely on pleasure. Two or three years ago, under the influence of the Fruit Growers' Association of Prince Edward Island, we made a shipment of apples to the British market, and I think we must be very honest people, because we never heard any complaints whatever of anything being wrong with the middle of the barrel. (Laughter.) We received word back from the very first shipments and from those that succeeded, that all the apples that we could grow of that variety could be sold at a price profitable to us, and to the greatest possible pleasure of those that were handling them in Britain. That is a great compliment to a people who are only starting out in that industry, and I think I am only paying myself and the other preachers of Prince Edward Island a compliment when I say that our people have not found out the way of being dishonest in that particular industry. (Laughter.) And we hope to continue in that way, and to make them not only honest in that regard but in every other possible regard. Nova Scotia has shipped a great many apples, from none at all almost forty years ago, to nearly a million barrels a year or two ago, and this year, although the crop is short, she has some 350,000 barrels of apples gathered from her orchards, the major part of which she is able to ship to the British market, while you have very few here to ship, I am sorry to say. We in Prince Edward Island have had a very dry year. When I came along in the train Prof. Robertson was telling me one of ex-Governor Hoard's stories, about an Irishman who was complaining that the season was so dry that even the pigs themselves had to be soaked to make them contain the swill. (Laughter.) Now you can see what a very great drouth has existed in that country, and as far as we were concerned in our Province we have had a very great drouth indeed. The fruit formed upon the trees, but from the 25th April to the 25th September we had no rain, and as a consequence much of the fruit fell off the trees, and our crop of apples is very small indeed this year, but we hope for better things next year. We are doing all we possibly can from the impulse we receive from such an Association as yours, and with the assistance we get from Ottawa, to see that our orchards are set out properly, to get the proper varieties to be grown in our country ; for commercial purposes the Ben Davis seems to be our favorite, and we are setting out many trees and attending to them, and we hope we will soon receive from our apple crop more profit than we receive now from our berries. I only hope that this Association will continue to do its duty, that the dishonest phases that now attach to the apple industry will quickly pass away. I

hope the people in Britain, when they see an article that is marked "Canadian," will immediately place it as among the first things in quality of that kind that can possibly be put up the market. I hope that there will be no suspicion whatever upon this industry, and that we may go on in leaps and bounds, and that one Province may excel in one thing, and one in another, that there may be enough good result in them all that they may join hands in the prosperity of the country and make it what it ought to be. We are a loyal, patriotic people to the institutions of the country, but that is not enough. We must all try to do all we possible can to push forward the industries of the country, because the people who are made more prosperous materially will be a better people in every sense. Now it has been said sometimes that the priest should stick to his prayer-book. Well, we have lots of time to pray, and lots of time to be of assistance to our people, and while we are giving assistance to our people we are in one continual prayer—(applause)—and therefore, although I have come a very great distance to be here, and come at some considerable disadvantage, I could not refuse the invitation extended to me by the Secretary of this Association, who has been kindness itself in regard to our initial industry down there, and the work which we are striving to do, and has done everything he possibly could to help us, indeed sometimes at great personal sacrifice. I could not refuse him when he asked me to come up and say to the people of Ontario one single word on horticulture in Prince Edward Island. These have been very scattered sentiments on horticulture, but they have been simply thrown out in order that you might see our good-will, that we are anxious to mingle with you and learn from you, and if we have anything in which we may instruct you we will strive to give you that instruction, so that one may benefit the other. I thank you for the way you have received me in this grand Province of Ontario, and I hope when I come back that you will be going on in the same lines as you are now, that you will continue to be the Premier Province of Ontario, that you will benefit us, too, by the instruction and by the work you are doing. (Applause.)

AWARDS OF MEDALS AT THE PAN-AMERICAN EXPOSITION.

Mr. W. H. Bunting of St. Catharines prefaced his reading of the list of awards of medals for Ontario fruit at the Pan-American Exposition, Buffalo, with the following remarks: Some months ago, when I had occasion to send out a call to the horticulturists and fruit growers of this Province to assist in connection with our exhibit at Buffalo, I am pleased to say that there was no section in the Province from which I received a more cordial and hearty response than from these united counties of Northumberland and Durham. Headed by your worthy warden, Mr. Rickard, a large number of your representative men in these counties came forward nobly, and I can assure you that a large measure of the credit which our Province has gained during the past season is due to the gratuitous and hearty efforts that were made by the gentlemen from this district who came forward and assisted me so nobly, and I am glad to say that to this section no inconsiderable number of these awards have come. Reference was made last night to the very cordial relations that have existed of late between our American cousins and ourselves. Prof. Van Deman was kind enough last night to refer to your representative at Buffalo in such kind terms, and I wish to say in his hearing that all through the past few months in connection with my duties at Buffalo from start to finish I received nothing, and those assistants who were with me received nothing, but the utmost courtesy, the utmost good feeling and the greatest assistance from the gentlemen in charge at Buffalo and from the various people with whom we came in contact. (Hear, hear, and applause.) Perhaps the most pleasant recollection we will have of our visit there is the fact that we were thus received and assisted; and even in connection with those with whom we came in friendly competition, although it was stated time and time again that our efforts there forced the representatives of the other States to make extra exertions in order to keep up in

their display with the display that was being made from Ontario. Although there was this friendly rivalry and competition, there was nothing but the utmost good feeling prevailing from start to finish, and this is one of the pleasant recollections and experiences of the last six months. It was very pleasant last evening for me to hear the very kind words of Prof. Van Deman in reference to the efforts that were put forward by us at Buffalo. I can only say that we are not deserving of anything complimentary whatever; we simply went there endeavoring to do our duty as well as we could, and the greatest pleasure we have at the present time is the fact that the Province of Ontario took no mean place in connection with the exhibit at Buffalo during the past season—(hear, hear)—and that we were successful in carrying off a large number of awards, which you find represented by the profusion of banners spread abroad in this building this evening. (Applause.)

THE ORCHARD, PARTICULARLY THE DEVELOPMENT OF FRUIT BUDS.

Prof. Waugh, Horticulturist of the State of Vermont, gave a lecture on this subject, illustrated with lantern slides. The hour being late, Prof. Waugh was obliged to condense his lecture, which was very instructive.

COMMITTEE UPON APPLIANCES.

The Secretary: I would like to move an additional committee. We have at our Association meetings from time to time a great many interesting appliances on exhibition for the use of the fruit grower. We have now the expansive tree protector, some spraying pumps, and a very valuable invention for the grading of fuits which I think is going to be of great importance to us. We do not wish to advertise these articles for the general public at all, but we want to have a committee to report upon them to us, what that committee of our own appointment think about them, and whether they are really of any value to us. I move that this committee be appointed, and consist of Mr. Scarff of Woodstock, Mr. A. M. Smith of St. Catharines, and Mr. J. E. Orr of Fruitland, and that they report to us this afternoon. (Carried.)

PRUNING.

By W. N. Hutt Southend.

The subject of pruning is very important. Pruning is a means to an end, and the end in view will determine in a great measure the kind of pruning we will do. For instance, if we are pruning for wood growth we prune after a certain fashion; if we are pruning for fruit we prune in another way; and if we are pruning for shade we prune in still another way. Of course in pruning the practical man should always have an idea of what he is about. Pruning seems to be a necessity for trees; in fact they are pruned in their natural condition. Every year the leaves are cast off the trees; this is Nature's method of pruning. Besides this, there is a constant pruning of buds and branches. If every bud on the tree were allowed to develop the tree would become a veritable brush pile, but in the natural way those buds which are at the ends of the branches get more sunlight and have better advantages of growth; they consequently grow larger in size, and those that are in the rear of them become starved more or less, and do not develop, and may even fall off. You notice that in this limb the larger buds are at the points of the branches. As most of the wood of the tree is made from the atmo-

sphere by means of sunlight, those that have most sunlight of course make most growth. So these in the rear are consequently deprived of their nourishment to a considerable extent, and become dormant. So you notice that trees prune themselves naturally. (Sample limb shown.) Take an ordinary growth. You notice its buds go around in spirals, but in this limb you have not that at all—Nature has pruned them off in her natural fashion ; they have become dormant and dropped off. In the same way trees are pruned of their branches ; those that are in the centre of the tree and underneath the crown do not get sufficient sunlight to perform their functions, and the branch becomes weakened and dies, and then the wind comes along—Nature's pruning knife—and cuts them off. Thus you find in the woods a great number of limbs that have fallen off. And this natural pruning seems to be an advantage to the tree. Those limbs that remain are less crowded, and it is to the general advancement and growth of the tree. The trees of the orchard, however, are not strictly under natural conditions ; we might say they are hyper-natural ; that is, by the arts of the fruit culturist and gardener we have raised that tree from its natural condition by selection, and pruning and fertilizing, to make a highly specialized growth. The trees in the orchard have simply been reduced to machines for producing fruit; and it is necessary that we should understand the working parts of this machine in order to make it produce as much as possible, of the best quality possible, and to keep up that production for the longest time possible. If you take a cross section of a limb or trunk of a tree you see it has a very characteristic appearance; the outside bark and the inner portion, darker in the centre and lighter toward the outside. Just between the bark and the wood, if we could see it, is a very delicate substance known as the cambium. This is the most important part of the tree, because from the cambium the growth of the tree takes place, and it is the only tissue that retains the power of active growth from year to year. This cambium is composed of a thin layer of tissue. It occupies a very small portion of the trunk, and you cannot see it in this dried limb,but if you take a fresh tree in active growth in the springtime you can tear off the bark readily and find the cambium beneath. It then shows as a soft, doughy or slimy substance that you can scrape off with your thumb nail. It is a very delicate substance. Exposure to the air will kill it in a few minutes. Examined with a microscope, it is composed of numerous brick-shaped cells put end to end, several rows of them. In the growing season they split down the centre and give off on the inside a layer of wood, and the outside a layer of bark, and then a small portion of cambium is left till the next year to carry on growth. It is a very delicate substance. and it is owing to the injuring of it that the trees show disintegration on the outside. For instance, if a tree is struck with something so that the cambium is bruised underneath, you will probably have a wound there on the side of the tree. As there is a ring of wood and a ring of bark formed every year, so the cross-section of a tree is the life history of that tree. Some rings are wider and some narrower. A wide ring shows a year of very favorable growth, or probably that tree has been well fertilized at that time. Other rings appear very small, probably because the year has been very dry, or the leaves may have been eaten off by insects. There are just as many rings of bark on the outside as there are of the wood; but as the tree becomes older the pressure from the inside bursts the bark, and it scales off from the outer portion, but there are several layers of it remaining to cover the cambium beneath. If we could look at the bark with a microscope we would find it composed of cells just like the cambium, but of a thin. corky nature. As Prof. Robertson said yesterday. still air is a non-conductor of heat, and it serves that very same purpose in the bark. Each cell contains its particle of air, and then another cell overlaps that. and forms a dead air space around the delicate cambium beneath and protects it from frost, just as in a building the dead air space is formed by the studding on the outside and the plaster inside. It keeps the cold from passing in and the heat from passing out. So you see how careful Nature is of these very delicate structures, the bark being a protection from frost on account of its dead air space. Then the outside wall of this cell of bark is of a tough, corky nature, is impervious to water and forms a water-proof cover for the tree. The sap in circling cannot pass out, and the cambium

cannot be dried out, but the sap must pass through the natural channels of the wood. The bark keeps all water from passing in and the sap passing out, and so is a perfect protection for the cambium external beneath. Nature is very careful of these delicate structures, and in all our operations of pruning we should be just as careful. It is a very bad practice for a farmer to allow any person to work in his orchard who is not pretty well posted on trees and their growth. We used to have the itinerant pruner, who went around and the value of whose pruning was judged by the number of limbs he took off. I think pruning, if not done by the owner of the orchard, should be done only by an employee in whom the owner has great confidence. We have the bark of the cherry that on the outside is of a very tough parchment-like nature. You have sometimes heard the remark that trees sometimes get in a hide-bound condition, the bark getting so tough that the trees cannot break through it, and it used to be the practice to take a knife and cut through the bark so as to allow the trees to expand. That has always proved to be a very bad practice, because if you cut through the bark the danger is that you will cut a little too deep and cut into the cambium, and cause a wound down the side of the tree. Even if you do not cut too deep the probability is that the pressure being removed just in one place, the tree will expand there and you will get an ugly growth on the side of the tree which later will split open. Nature seems to provide for all these difficulties, and after a while, if the tree is kept in a growing condition it will rupture the bark itself, here a little and there a little, and the tree will expand naturally. We can assist Nature by keeping the tree in a healthy condition, keeping it growing, and if we do that it will take care of itself, and we need never cut the bark of the tree for that purpose.

Mr. Boulter: Would you apply that principle to an apple tree as well as to a cherry tree?

Mr. Hutt: I do not have that difficulty with an apple tree, because the bark is not of a parchment-like nature. The bark is the natural protection of the wood, but the outer bark that scales off is not of very much value—it is the inner bark, the layers that are still growing, that are the natural protection of the tree. I would advocate scraping trees, if you do not scrape too closely, so then the rough edges are removed and insects have not a chance to harbor there. I do not believe in cutting a so-called hide-bound tree.

Mr. Graham: I saw a young orchard this season of 500 Ben Davis trees, and they were split right down the trunk of the tree; that is, the bark, I mean.

Mr. Hutt: We do not want the bark to split, because if the bark splits, unless it is covered with something, you will have a wound there. I have never noticed that with apples trees, but I have with cherry trees.

Mr. Graham: Prof. Bailey advocates slitting the bark of the cherry trees down.

Mr. Hutt: It might be advisable in some circumstances.

Mr. Boulter: I have slit trees down with a knife and had them growing over very nicely, and had very good results.

Mr. Hutt: Why would you slit the bark of an apple tree?

Mr. Boulter: To let it grow faster.

Mr. Hutt: If you injure the bark there is a wound to be healed over, and the tree is not in a normal condition until the wound is healed over.

The President: May I ask Prof. Van Deman to give us a word on that?

Prof. Van Deman: I do not want to interrupt the lecture. If I were to take sides I would side squarely with Mr. Hutt. Nature knows what she is about. Nature knows how to grow a tree. Don't you suppose that the skin on a man's leg expands just as Nature demands it? And it is the same with the bark of a cherry tree or any other tree. No, let Nature take her own course in that respect. I do not believe there is such a thing as a hide-bound tree. I do not think there is any more use of splitting down the bark of a tree than there is of splitting a pigs' leg in order that the pig may grow. (Laughter.) I do not think it is reasonable at all. Of course we can help Nature out. The bark is there for a certain purpose; it is a non-conducting material that is placed there for the protection of the parts within, and if we do not interrupt

Nature's work the tree will place its bark just as it ought to be placed, that is my opinion. Of course I believe in pruning, but not in splitting bark.

Mr. Boulter : Have you noticed trees that have been split down ?

Prof. Van Deman : Yes; I have done it myself.

Mr. Boulter : Have you seen any bad effects ?

Prof. Van Deman : Yes, I have, because it makes an abnormal growth in one place. It relieves the strain in one particular place, and there is an excessive growth there, and it puts the tree out of balance.

Mr. Boulter : Suppose you split all around the tree, would there be abnormal growth there ?

Prof. Van Deman : The effect would not be as harmful as if you cut it in one place; the more places you cut it the better it would be, but I do not see why you should cut it at all. Why, there is power in that cellular growth that would split a cannon. It is bound to come out, and wherever the strain is greatest the bark will split soonest, and Nature will take care of that bark-splitting business if we will just keep the tree growing.

Col. Roger : I have learned a great deal in the last ten minutes. I have had a great deal of trouble in employing pruners in my orchard, to prevent them from doing something there that they think is very clever. When you get one of the ordinary mechanics, after sawing a limb he takes his knife and pares it around, and I have one man particularly that I almost fight with to prevent him from making a round top to the wound. Although I am only a practical m an, and do not pretend to be scientific at all, it is my opinion that if you round off that knuckle at all you have just that much additional raw wood to cover with the new growth. Am I right ?

Mr. Hutt : Yes.

Col. Rogers : I am glad I am right, and if I had some of my men here I would make them ashamed of themselves, because they said, "You want to pare that round ; it looks neat." "Well," I said, "that is where the new growth comes, and the more you cut off the longer it will take to heal over."

Mr. Hutt : Exactly.

Col. Rogers : I like to use as fine and sharp a saw as possible, leave the wound as smooth as possible, so that it won't catch and droop. I have learned one thing in this room that is worth a great deal to me, about sawing the limbs with a slant instead of square off, that will shed the moisture and the rain and lead to the speedy recovery of the wound. Would you advise painting, or using something in the way of grafting wax ?

Mr. Hutt : I will mention that a little later on. To proceed just where we left off, speaking of the function of the bark, it shows how careful Nature is of these delicate structures. I have samples here of injured limbs, showing how slight an injury will make considerable effect on the tree. Here is a limb that has a roughened portion caused by just simply swinging in the wind and knocking against something else. This was taken off a tree last year that was hanging with rows of apples, and there was only one apple on that limb, showing the effect of the injury. Here is another that has a great ugly-looking growth made in the same way, the limb just swinging back and forward, and the insects have got in here and made this their harbouring place. Here is a wound caused by a ladder, making an ugly-looking growth. Here is a wound caused by the heel marks left by people climbing in and out of the tree. We should prune with rubber boots on, the same as is done in packing trees in the nursery and the same as in picking fruit, so that nails and boots do not injure the trees. Pruning is a delicate operation at best. Some people think the more you cut off the better the trees get along, and that they will stand any kind of cutting. Trees should not be cut nearly as much as we do cut them. Nature's way of pruning them shows how careful we should be of these delicate structures.

Mr. Demill : Explain the term "sun-scald."

Mr. Hutt : I do not know that I can explain it, except simply that we have the effect on the tree, where the bark shows dead on the outside portion. It seems to be

dark quite a way in, and when it becomes old it comes off and has a scurfy appearance. It is supposed to be from too much sunlight on the tree, that simply burns it.

Mr. Boulter : Or in winter time when the sap is going up and down and freezing ?

Mr. Hutt : I think it is usually from the sun burning the tree.

Prof. Van Deman : That is one of the most difficult things that I have had to deal with yet, one of the hardest things to understand, and really I confess that I know very little about it now, after all the years that I have been watching it. I very much doubt that the sap actually is heated or the delicate parts are heated to such a degree by the sun's rays that the cells are killed; but sometimes we have in the winter time an action of the sun in thawing out the tree on one side, while the other part is frozen, and we have cracks made by this difference in the tension of the internal parts of the tree that opens the seam. It cannot be but very small, so that it can hardly be noticed, and evaporation may take place then, but there is a rent in the bark or in the wood sometimes which occurs, and then other injuries may result from that.

Mr. Demill : In time it will kill the tree ?

Prof. Van Deman : It will hurt the tree, and sometimes kill it. I have seen trees that were actually split open so that I could see right through ; but when we come down to the strict term sun-scald, I doubt very much if the sun ever actually cooks the living parts of the tree. In pruning the tree I think we ought to be careful not to lay back the branches of the body of the tree in such a way that the sun does shine upon it in an unnatural way.

Mr. Boulter : Did you ever see sun-scald in a tree where the suckers are growing up around it ?

Prof. Van Deman : No, sir; not apt to be, because these rapid changes do not take place, they cannot take place, because the temperature is kept quite even.

Mr. Boulter : Did you ever see it affected if it were protected by a board put down on the south side of the tree ?

Mr. Van Deman : I have seen them protected in that way. In Wisconsin they do that to keep off these winter suns, because, though the sun does not get hot enough to cook the sap, there is an inequality. In a forest usually if a tree stands out by itself the limbs grow down so horizontally that they protect the tree so that the body very rarely comes in contact with the sun's rays, and there is where the wood grows the best. It wants to be kept of an even temperature.

Prof. Waugh : Mr. Boulter's question starts me off. He asks if we ever see sun-scald where the suckers begin ; but I find usually suckers on a tree that has sun-scald. The sun-scald brings on the suckers. As to the cause of this sun-scald we have observed it very attentively, and it is a great difficulty to some of my trees and methods of pruning, and after having observed this closely and on the information of others for a number of years, I feel very much that the sun-scald, as we call it, always takes place in the winter time. It is not a summer difficulty at all, it is a winter difficulty, and you find it worse in the places where the winters are severe, and the statement of the cause which is somewhere near the truth is this : that the sun comes on pretty hot during the afternoon in a certain part of the winter, and it is very warm on that side of the tree. I have seen some figures of a thermometer, but I would not dare to quote them from memory; the thermometer comes very high, then it may go down to 15 or 20 degrees below zero during the night. That tree is thawed out fifty or sixty times during the winter, and the sap is thawed out, and then frozen during the night, and one cell is broken away from another, so that this tender cambium layer is broken to pieces, and in the spring when it should start to grow it is all dried out and it does not grow any more and it is dead. The frost-cracks of which Prof. Van Deman spoke are different. They do not bother us much as a practical thing in the orchard, but this sun-scald is a difficult thing, and the great remedy for it is to prune the trees down low and not expose the branches. Where the trunks must be exposed, a great deal of help can be got by putting up a board or something to prevent the sun striking the tree in that part of the day when the sun is warm.

Prof. Van Deman : I think Prof. Waugh has made it much more plain than I did, that it is inequality of the temperatures that has caused this drying out and cracking ; and right there is one point that I feel like impressing upon you. It sometimes occurs that the germs of blight early in the spring get into these places and actual blight occurs.

Prof. Waugh : The germs of apple canker get in there much oftener.

Prof. Van Deman : Yes, that is a thing that is rather local in its character. This is the region, but westward there is very little apple canker. Any of these sporadic germs may get into this rent, into the living tissues of the wood and then spread, and do a great deal of damage which we really do not understand at all.

Mr. Thompson : Would not cedar bark be better than wood ?

Mr. Hutt : Yes, but I think the difficulty can be obviated a great deal by the way in which you trim. Keep the trees more or less protected. We always find that that difficulty happens in unprotected situations. I have not had much experience with it in Welland where my orchard is.

Col. Rogers : I think a great deal of difficulty is from very excessive pruning. I will give you an instance. In my ignorance I one time grafted a number of my trees and did not cut a great deal of the top off at first, very properly. These grafts took remarkably well, and put out a vigorous growth, and the second season the grafts were in a very satisfactory condition, so much so that I thought I must take off all the rest of the top. If I had done it gradually I might have got away with the difficulty, but I made too vigorous a pruning, and then I began to see a similar wound to what we consider the sun-scald down the side of the tree, and in my judgment that wound is very much brought about by the vigorous pruning. It is often done I think by the action of the borers in the limbs. I think there is something in the too sudden checking of the flow of sap up and down the tree that produces what we used to call sun-scald.

Mr. Hutt : There is no doubt that in very vigorous pruning we rather check the economy of the tree and put it out of its regular habit altogether.

Prof. Macoun : The question of sun-scald is very important to northern growers ; I do not think that in this district it is so important, but I think the more thoroughly it is discussed the better. We find it very troublesome in the Ottawa District, and all up the Ottawa River, and I presume it is the same in the northern parts of Ontario. We have imported from the Western States these tree protectors which they use out there, simply thin veneer, which they make 2½ ft. long. We train out trees very late, and we simply bend the veneer round the tree and fasten them with a wire or string, leaving an air space between the protector and the tree. The air space keeps the tree very much cooler than if it were paper or something bound round close to the tree. This protector stands out about an inch on each side of the tree, or more, and we find the effects very good indeed. Any of you who are living in northern Ontario, where you cannot get this veneer, can go to the woods and split the bark off birch trees and make protectors. I think if the subject were well understood the basket makers would make these protectors, as they could be made very cheaply. We get ours at a cent a piece.

Prof. Van Deman : They cost $3 a thousand, ten or twenty inches wide.

Col. Rogers : I can suggest a remedy that would be cheaper with most of us, and that is tar paper. To prevent the action of mice in my orchards I take a piece of tar paper and roll it around a broom handle, in two feet squares, and it will keep its shape, and you could put that around the tree and tie a little string around it the first year, and it is, I think, the cheapest preventive of the depredations of mice I ever tried. The next spring you can gather up these rolls and use them over again for four or five seasons, and as the twist does not go out of them you do not need to tie them after the first time, as they will adhere to the tree, but not close enough to injure it all.

Prof. Macoun : Do you leave an air space ?

Col. Rogers : You do not repuire an air space during the winter season.

Mr. Caston : It is too bad to be interrupting Mr. Hutt in his interesting lecture, but this difficulty of sun-scald is very important to those who live in the northern districts, and I think Prof. Waugh has just hit the matter exactly. There has been a great

deal of discussion as to what caused those black streaks in the Northern Spy and Ben Davis, and some other commercial apples. I believe in these sections it occurs about the end of March or the beginning of April because we have a summer temperature on the southwest side of the tree just where the difficulty occurs; then the temperature goes down and we have a winter temperature at night, and when that occurs day after day at a time when the maple sap is flowing, the consequence is that the tissue on the southwestern part of the tree is destroyed, and we have a black streak from top to bottom. At the same time I believe some newly planted trees in the hot summer sun—because we have, to all intents and purposes, a tropical climate for several months—suffer from what is called sun-scald, and this will cause in some varieties a black streak. I think it should go out from this Association that it is very important, especially in the northern sections of this Province, that these trees should be protected, especially where the orchard stands with a southern or southwestern exposure. Where there is a northern exposure there is generally a cool wind blowing at that season that makes a great difference.

Mr. Shepherd: I think Prof. Waugh explains the difficulty very well. All the apple growers in the northern regions, where we have plenty of snow that lasts till nearly the end of April frequently, are quite well acquainted with the sun-scald, and in all the orchards that I visited in the Province of Quebec, the general practice is to branch the trees low. Our Fameuse is very much addicted to sun-scald. I had written a short paper on Quebec orchards to show you that the Fameuse in the Province of Quebec is our most profitable apple by a long way—we do not consider anything else comes near it—and notwithstanding what Mr. Caston had said we can prove that in the orchards where they have sprayed they have grown this year and for some years the finest Fameuse I have ever seen. Mr. Jack, my colleague, can tell you about that. His neighbor who did not spray this year lost actually two or three thousand dollars by not spraying.

The President: Mr. Hutt will please proceed with his very much interrupted address.

Mr. Hutt: This lighter-colored portion of the wood next the cambium is known as the sap wood. It is through this portion that the sap containing its dissolved mineral elements finds its way up to the leaves. In the leaf the watery part of the sap is evaporated, and the remainder, under the action of light, combines with the carbon-dioxide of the atmosphere, and returns downward through the cambium layer and is used up in growth. The circulation of sap is well illustrated in the practice of ringing grape vines. The sap passes up to the leaf through the sap wood of the cane, but being unable to return past the ring of dead cambium, it shows itself in early maturity and increased size of fruit. This darker central portion of the stem is the heartwood. It had once sap-carrying vessels like the sap-wood, but after working for some years the vessels have become plugged up, coloring matter has been deposited and that part of the stem has become dead tissue. From this time on the heart-wood plays no part in the life processes of the tree, except to give the trunk rigidity.

The situation of the root of a tree is the same as that of the trunk, in fact, the root may be considered as simply a branched extension of the trunk underground. Since the large roots are thickly covered with bark, which has already been described as an impervious waterproof covering, it is evident that little or no moisture is taken in by the large roots. This fact shows the mistake of applying manure, or fertilizers, near the collar of the tree. In order to facilitate the passage of water into the tree there are along all the small roots and fibres delicate structures, known as root-hairs. These hairs, by virtue of the small openings they contain, rapidly absorb the moisture from the soil. Root-hairs may best be seen in some seedling plant like a bean, but every tree has them in thousands. Like the cambium, root-hairs are so delicate that drying for a few minutes will kill them. It is the destruction of the root-hairs that makes successful transplantings so difficult. If trees could be taken from the nursery and be planted again without the loss of root-hairs, they would never know that they had been moved. This, however, is practically impossible, except with the smallest seedling trees, yet it shows that too great care cannot be exercised in protecting the

roots of trees during transplanting. It is owing to the heavy loss of fibrous roots, with their root-hairs, that it is so difficult, nay almost impossible, to transplant large trees. In taking them out of the soil most of the smaller roots with their absorbing root-hairs, are cut away, while the roots near the trunk which are left are covered with the thickest bark, and have little or no power of putting out root-hairs, or of absorbing moisture from the soil. As soon as the leaves come out on such a tree what sap there is in the tree is dried out and the tree dies. It is a good plan in transplanting large trees, or indeed any tree, to cut back the large roots the previous year, so as to cause the tree to send out nearer the trunk a strong growth of young roots, which will not be removed when the tree is dug up. You know how difficult it is to successfully transplant evergreens. Since they have always a maximum of foliage, and there root systems must necessarily be reduced in removing them from the nursery, the large top gives off moisture faster than the reduced roots can take it up, and so the tree dies. If we observe these things in transplanting trees we will have a good deal better success. All bruised and damaged portions of the root should be removed with a smooth, sloping cut. If trees are dried from exposure or delay in shipment the roots should be cut back to fresh living wood. When the cut surfaces are exposed to the moist soil the cambium grows over the end and forms a callus. This callus not being covered with a tough bark like the rest of the root, very readily gives rise to a vigorous root growth. For this reason, the rooting of layers can be hastened by nicking the bark and exposing the cambium to the soil, so that a callus is formed.

Since the root of the tree was reduced in transplanting we find it necessary likewise to reduce the top in a similar proportion. If this is not done and the season be a dry one, the trees have much lessened chances of surviving. All the foliage of the top is constantly giving off moisture, while the root has been reduced, consequently, we must reduce the top to form a kind of balance between top and root, and the tree is left more in the condition in which it was before it was removed from the nursery. But in reducing the top of the tree we must observe that the best developed buds are at the tips, and these are the ones that make the earliest growth in the spring. Consequently, we must not head back all the leaders, thereby removing the strongest buds, but we must leave one or two of the best leaders to start the growth early in the spring, and then thin out the lower branches.

As soon as the tree has established itself in the soil its energies should be directed to wood growth. The more foliage a tree has the more wood it is forming, consequently, young trees should be quite leafy, so as to get them to maturity early, for before a tree is mature it will not bear a great quantity of fruit. If the trees are whip-like they might be allowed, for the first year or so, to grow leafy right up the trunk. If, however, they are stocky trees the side buds may be removed and the whole energy directed towards forming the head.

A very important point about the orchard is the height at which the heads of the trees should stand. It used to be that low-headed trees were preferred, because they were less exposed to wind and the fruit was more easily picked. Of late years we find the best results can only be got by intensive cultivation, and as spraying has come to be a necessity and requires considerable driving through the orchard, the trees have to be somewhat higher than formerly. (Hear, hear.) If we have started the head of a tree at a certain height it will always be just at that height. For instance, if you start a main limb at five feet in a little tree, and that tree is living twenty years from now, that limb will be just five feet from the ground. After the head is started at any point, the trunk will not lengthen, but has growth only in thickness. All the growth in length in a tree takes place only at the bud or growing point. If we start trees too low they will always be too low.

Mr. Caston : As a matter of fact, there is not much danger in starting a tree too high. Most people head their trees too late, and they have to do heroic work afterwards in order to get cultivation amongst them.

Mr. Hutt: Yes, but that depends somewhat on the variety of the tree. Upright-growing varieties such as the Spy may be started lower than the Rhode Island Greening, which has a crooked, drooping growth. Trees should be started with not too many main limbs, for afterwards when the tree becomes mature it has become so thick that it is necessary to take out large limbs. In cutting out large limbs we make large wounds, which are a menace to the vigor and longevity of the tree. In all pruning the fact should be kept in mind that the leaves make nearly all the food used by the living cells of the tree. If large branches, with many leaves, are removed, the cells must undergo a corresponding process of starvation until new leaves are formed. The ideal pruning consists in removing not branches, but buds; not in checking growth but in directing it. It is easier, and also less shock to the tree, to pinch off buds here and there when the tree is young, than some years later to saw off large misplaced limbs. Trees should be so formed and shaped when young that in later years trimming will be only slight, and it will never be necessary to cut out a very large limb. Three, and at most four main limbs, make a nicely formed head, but they should not all be started at the same place in the trunk. The distance should be evenly divided and each large limb should have the whole trunk opposite it to brace against. Opposite and triplicate crotches should be avoided, particularly in peach and plum trees, for when heavily loaded the trunk is apt to be split down by the wind, and the tree is practically ruined.

Trees have naturally two methods of reproducing themselves—by buds and by the seeds of the fruit. Every bud on a tree is capable of reproducing that tree. Every bud of a tree is an individual; indeed, it is not the twig, or branch, or tree, but the bud that is the unit of plant development. Budding and grafting are only examples of vegetable reproduction by bud development. When a tree is growing rapidly and producing a good deal of wood and very little fruit, it is simply trying to reproduce itself by bud reproduction. On the other hand if a tree is fruiting heavily it is trying to reproduce itself by seed. The wood growth and fruit growth of a tree stand in a sort of counterpoise to each other. If a tree is growing vigorously it is not producing much fruit, and if much fruit, not much wood. Here is an example from a plum tree: This little twig (about 2 inches long) has taken ten years to grow, because the tree was busy producing fruit. This shoot (about 2 feet long), producing, as you see, a great many buds, grew in one year and did not raise any fruit. If we check the vegetative growth of a tree we cause it to form fruit; on the other hand, if we take the fruit off a tree before it is developed we stimulate wood growth. Vigorous pruning in summer, when the growth is in full swing will stimulate the production of fruit, but if the pruning is too vigorous the trees may be injured or even killed. I have seen pruning done in summer to stimulate fruit production have just the opposite effect, because it was not done intelligently. The pruner would thin the smaller limbs or go up the large limbs and take out every other branch. In this way many of the fruit-bearing branches were removed and wood growth still further stimulated. The correct method would have been to have headed back the most vigorously growing branches and not to have touched the smaller limbs on which the fruit would have been formed. As I said before, the reducing of the foliage of a tree limits its nutrition and more or less strikes at the vitality of the tree. Heavy pruning I would recommend only as a last resort. A safer method would be to stop cultivation, or to seed down with a cover crop, or the plow might be run a little deeper so as to cut off the surface-feeding roots and root-prune the tree. Pruning for vegetative, or wood growth, is that which has been outlined for the growing tree. Cut out all dead, broken and deformed limbs, and those which cross and rub one another. Care should be taken to keep the tree free from suckers, so that there is a free circulation of air through the tree, and the sunlight let in sufficiently to give the fruit a good color.

QUEBEC ORCHARDS.

By R. W. Shepherd, Como, Que.

I would like to speak to you to-day about our orchards in Quebec Province. Apple growing on the Island of Montreal is an old story—over 250 years old. There are large and extensive orchards to-day on the Island, but I fear they are not as flourishing as they were soon years ago, and, if the past season be taken as a sample, the orchards on the Island are scarcely profitable. Most of the owners of large orchards around the city are extensive market gardeners first, and apple growing takes second place. This, to my mind, is one of the chief reasons why the orchards are less profitable than formerly.

When there was no such thing as spotting, and fungous disease, it was no trouble for the owners of orchards near Montreal to grow the finest Fameuse in the world, but the market gardening orchardist is too busy in the spring with his vegetables and hot beds and does not find time to spray his trees thoroughly, and the result is poor and unprofitable fruit. There are more prosperous orchards to-day on the mainland, south and west of Montreal, because the owners give time and attention to the spraying and the care of their trees. The apple belt of the Province—i.e., where large commercial apple orchards are found—is limited to Montreal Island on the north and the counties directly south and southwest to the United States line and west, in the Ottawa Valley around the Shores of the Lake of Two Mountains. The principal variety cultivated is Fameuse, but McIntosh, Wealthy and some late keepers are being largely planted. The County of Rouville is a great apple growing county. On the slopes of the three superb mountains of that county, Beloeil, Rougemont and Yamaska, are some of the most productive orchards—principally Fameuse—in the Province. At St. Hilaire (Beloeil) are very large Fameuse orchards in fine condition, and the owners for several years having paid particular attention to spraying, have had large crops of fine fruit the past season. Some of the owners (in good years) realize five thousand dollars for their crop. In Huntingdon County there are some large orchards and in Chateauguay County some of the best and most flourishing orchards in the Province are to be found. In the Ottawa Valley—around the shores of the Lake of Two Mountains are some fine orchards—at Oka the Trappist Monks have large young orchards just coming into bearing, and a very extensive vineyard where grapes for wine are successfully grown. At Como on the south shore of the lake in Vaudreuil County my own orchards are situated. In this district the principal varieties cultivated are Fameuse, St. Lawrence, McIntosh, Wealthy, Golden Russet, Canada Red, Canada Baldwin and a few other late keeping varieties. But you will observe that in all these apple growing districts "La Fameuse" is the chief and most profitable variety of all the old French-Canadian varieties, and is the one and only variety which has survived, and after 250 years still holds first place, the old Pomme Grise, Bourassa and Revettes, being now rarely seen and not counted commercial varieties at all. Although we cannot grow commercially, the great variety of winter apples for which your Province is famous, yet those we do know attain a high color and good size. Our red apples are, perhaps, the reddest in the world. Our Fameuse and McIntosh cannot be surpassed for richness of coloring, and experience teaches us that rich red color is a commercial feature in exportable apples. Our apples are largely consumed at home and the city of Quebec takes a goodly share; some are exported to Newfoundland. The English market will take all the first quality of Fameuse we can send them, carefully selected and packed in boxes they give the highest satisfaction. As a rule the trees in the old orchards have been planted too close together, and this is most noticeable on the Island of Montreal, where it has been the custom to set the rows twenty-five feet apart and the trees 20 feet in the rows, and sometimes less than that. But in our new orchards the era of spraying has rectified this fault, and the distance apart which trees are planted is now pretty well understood to be not less than 30 feet each way. We have heard it said frequently that the Fameuse is dying out, but the largest growers of apples in our

Province do not believe that. More Fameuse are being planted out every year now than was the case in former years. Of course if spraying to prevent the spotting of the fruit had not been discovered, the growers of Fameuse would soon have become disheartened if they had many repetitions of the crop of 1897, for instance. But perseverance in thorough spraying, has convinced our growers that there is still money to be made out of growing Fameuse, and since we are able to export that variety in boxes, profitably, the demand for that apple is practically unlimited. As long as an apple is profitable to grow it will be grown, and because of its profitableness the Fameuse has survived for upwards of 250 years when other old varieties, equally popular, have long since practically passed out of existence.

The early French missionaries, the St. Sulpicians, were out in Montreal a long time before the Conquest, and they brought seeds from France and kept sowing the seeds, and at last was evolved La Fameuse, which is considered the best apple, as we grow it, in the world. (Hear, hear.) And I can tell you this, that the English market will take all the Fameuse we can send them, if we send it to them in good condition. I have had considerable experience in that, and I could read you letters that I have in my pocket, that I have received from persons without solicitation, that would convince you at once that they will take all they can get.

Col. Rogers : I heard you shipped some to the Prince of Wales, and received a letter.

Mr. Shepherd : The Prince of Wales has been getting apples from me since 1896. The King got Fameuse this year. (Applause.)

(Mr. Shepherd then read letters from Mr. Hugh Allan, of the Allan line, and Mr. Becket, the chairman of that line in Liverpool, who said, "They are the best apples I have ever seen from your side of the Atlantic. There are no bruises or moisture. If the Canadians could supply our Liverpool and London markets with some of those apples they would cut out apples of every kind as to color and flavor.")

Mr. Shepherd : I was going to suggest that we ought to have a joint convention at Ottawa. Some twelve or fifteen years ago we had a Dominion Convention. We want our Society and your Society to come together. There are broad questions to discuss such as the Fruit Marks Act, Transportation, Cold Storage, etc., which we are all interested in; and we would like to get our worthy friend from Prince Edward Island up here, and Nova Scotia people, and such a meeting ought to be arranged. We have our meeting at Coaticook on the 18th December, and I expect some delegates from your Society there.

Mr. Jack, Chateauguay Basin, Quebec: I expected Mr. Shepherd was going to do all the talking for Quebec when he started off, but I see he is going off to leave me to do a little. With him I would like to say I am very much pleased with the treatment we have received since we came here. I would like to put in a few remarks about our Association in Quebec. The other day when Mr. Jones was speaking about the Fruit Growers' Association he did not mention the opposition, as it were, we have to contend with in Quebec. You people in Ontario do not realize what we have to contend with there. In the first place we are divided from what is known as The Horticultural Society, which really started before ours ; ours was a branch from it. We did not consider that they were doing what we thought would be right, and we organized this branch society. I am a member of both. Then besides this opposition is the two languages. You do not realize what a great draw-back that is. It is extra expense in printing our reports, and a good many people do not talk French, and when they get to these meetings it is a hard thing as we have to hold meetings in the French section at least every two or three years, and it is difficult for the English speaking people to know what is going on. Our last summer meeting was held in River du Loup, and everything was talked or read in French. I understand French ; but there is a lack of interest. I have not been able to interest one Frenchman in spraying enough to do it thoroughly, although we have been having successful crops for at least ten years. Then another thing is climatic conditions. You people here think it is an easy thing to grow Spys, and you do not grow Kings to any great extent.

The President : O, yes.

Mr. Jack : We cannot grow Kings, or Spys, or Greenings, or American Baldwins. We have to select our hardiest varieties and grow them, which is another thing we have to contend with. Well, we are trying to interest our compatriots. Mr. Shepherd spoke about my neighbor who had lost so much. You know that after the blossoms drop there is a certain amount of dropping of the apples after a week or ten days, and my neighfor went through his orchard just at that time and saw a good many fallen apples, and the Fameuse are very deceptive as to the quantity on a tree, and he said, "I am not going to spray my orchard. It will cost me too much. It is not worth while." He came over and talked with me, and I advised him to spray, but it was no good. The result was that when he went to pick his apples this fall I do not think he got 5 per cent. of choice apples, and right over the fence in the orchard next to his I think we got 90 per cent. clear fruit from spraying. If his apples had been sprayed and cared for, there was nothing to hinder him from having a thousand barrels of choice fruit, and I estimate that he lost nearly five hundred barrels on account of not spraying, worth $2,000. He shook his apples down and turned his pigs into the orchard in a year like this—and that is a Scotchman, I am sorry to say—(laughter)—a man whom you would expect would understand these things. I think there are only about three men in Chateauguay who spray thoroughly enough to make it a success. Well, we are trying to interest those fellows in spraying and fruit growing, and I hope some time our Society will be just as massive and strong as this Association is. (Hear, hear and applause.) We spray three times, once before and twice after blossoming.

Mr. Harold Jones (Maitland): Mr. Jack need not feel discouraged in regard to the results of their work. I was never so much pleased with any meeting as I was with theirs in Huntingdon last year, knowing that it was their eighth annual meeting, and that their Society was practically in its babyhood compared with ours. The meeting showed as much interest and had as large an attendance and in every way was just as encouraging and enthusiastic as ours, and more so than ours was at Brantford last year, and our Association is forty-two years old. We have the Government at our back, we have the money and the men, and we could not gather the interest of Brant County around us. In Quebec they have a small grant and a few men, and they went into Huntingdon and got the most intense interest taken, and I think they should feel very hopeful of the results of their work.

FRUIT MARKS ACT.

By Prof. J. W. Robertson, Agricultural Commissioner, Ottawa.

The speaker prefaced his discussion of the subject by inviting his auditors to read the Act, copies of which were distributed through the hall. The Act and instructions read as follows :—

AN ACT TO PROVIDE FOR THE MARKING AND INSPECTION OF PACKAGES CONTAINING FRUIT FOR SALE.

(Assented to 23rd May, 1901.)

His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows :—

1. This Act may be cited as The Fruit Marks Act, 1901.

2. This Act shall come into operation on the first day of July, nineteen hundred and one.

3. In this Act, unless the context otherwise requires,—

(a.) The expression "closed package" means a box or barrel of which the contents cannot be seen or inspected when such package is closed ;

(b.) The expression "fruit" shall not include wild fruit, nor cranberries, whether wild or cultivated.

4. Every person who, by himself or through the agency of another person, packs fruit in a closed package, intended for sale, shall cause the package to be marked in a plain and indelible manner, before it is taken from the premises where it is packed,—

(a.) with the initials of the Christian names, and the full surname and address of the packer ;

(b.) with the name of the variety or varieties ; and

(c.) with a designation of the grade of the fruit.

5. No person shall sell, or offer, expose or have in his possession for sale, any fruit packed in a closed package and intended for sale unless such package is marked as required by the next preceding section.

6. No person shall sell, or offer, expose or have in his possession for sale any fruit packed in a closed package, upon which package is marked any designation which represents such fruit as of finest, best or extra good quality, unless such fruit consist of well-grown specimens of one variety, sound, of nearly uniform size, of good color for the variety, of normal shape and not less than ninety per cent. free from scab, worm holes, bruises and other defects, and properly packed.

7. No person shall sell, or offer, expose or have in his possession for sale, any fruit packed in any package in which the faced or shown surface gives a false representation of the contents of such package ; and it shall be considered a false representation when more than fifteen per cent. of such fruit is substantially smaller in size than, or inferior in grade to, or different in variety from, the faced or shown surface of such package.

8. Every person who, by himself or through the agency of another person, violates any of the provisions of this Act shall, for each offence, upon summary conviction, be liable to a fine not exceeding one dollar and not less than twenty-five cents for each package which is packed, sold, offered, exposed or had in possession for sale contrary to the provisions of this Act, together with the costs of prosecution ; and in default of payment of such fine and costs, shall be liable to imprisonment, with or without hard labour, for a term not exceeding one month, unless such fine and the costs of enforcing it are sooner paid.

9. Whenever any fruit packed in a closed package is found to be falsely marked, any inspector charged with the enforcement of this Act may efface such false marks and mark the words "falsely marked" in a plain and indelible manner on such package.

2. The inspector shall give notice by letter or telegram to the packer whose name is marked on the package before he marks the words "falsely marked" on such package.

10. Every person who wilfully alters, effaces or obliterates wholly or partially, or causes to be altered, effaced or obliterated, any inspector's marks on any package which has undergone inspection shall incur a penalty of forty dollars.

11. The person on whose behalf any fruit is packed, sold, offered or had in possession for sale, contrary to the provisions of the foregoing sections of this Act, shall be prima facie liable for the violation of this Act.

12. Any person charged with the enforcement of this Act may enter upon any premises to make any examination of any packages of fruit suspected of being falsely marked in violation of any of the provisions of this Act, whether such packages are on the premises of the owner, or on other premises, or in the possession of a railway or steamship company ; and any person who obstructs or refuses to permit the making of any such examination shall, upon summary conviction, be liable to a penalty not exceeding five hundred dollars and not less than twenty-five dollars, together with the costs of prosecution, and in default of payment of such penalty and costs, shall be liable to imprisonment, with or without hard labour, for a term not exceeding six months, unless the said penalty and costs of enforcing it are sooner paid.

13. In any complaint, information or conviction under this Act, the matter complained of may be declared, and shall be held to have arisen, within the meaning of

Part LVIII. of The Criminal Code, 1892, at the place where the fruit was packed, sold, offered, exposed or had in possession for sale.

14. No appeal shall lie from any conviction under this Act except to a superior, county, circuit or district court, or the court of the sessions of the peace having jurisdiction where the conviction was had; and such appeal shall be brought, notice of appeal in writing given, recognizance entered into, or deposit made within ten days after the date of conviction; and such trial shall be heard, tried, adjudicated upon and decided, without the intervention of a jury, at such time and place as the court or judge hearing the trial appoints, within thirty days from the date of conviction, unless the said court or judge extends the time for hearing and decision beyond such thirty days; and in all other respects not provided for in this Act the procedure under Part LVIII. of The Criminal Code, 1892, shall, so far as applicable, apply.

15. Any pecuniary penalty imposed under this Act shall, when recovered, be payable one-half to the informant or complainant and the other half to His Majesty.

16. The Governor in Council may make such regulations as he considers necessary in order to secure the efficient enforcement and operation of this Act; and may by such regulations impose penalties not exceeding fifty dollars on any person offending against them; and the regulations so made shall be in force from the date of their publication in The Canada Gazette or from such other date as is specified in the proclamation in that behalf; and the violation of any such regulation shall be deemed an offence against this Act and punishable as such.

PRIVY COUNCIL, CANADA.

At the Government House at Ottawa,
The 14th day of September, 1901.

Present: His Excellency the Governor-General in Council.

Whereas by Section 16 of the Act 1, Edward VII., Chapter 27, intituled "An Act to provide for the Marking and Inspection of packages containing Fruit for Sale," it is provided as follows:—

"16. The Governor in Council may make such regulations as he considers neces-
"sary in order to secure the efficient enforcement and operation of this Act; and may by
"such regulations impose penalties not exceeding fifty dollars on any person offending
"against them; and the regulations so made shall be in force from the date of their
"publication in the Canada Gazette or from such other date as is specified in the procla-
"mation in that behalf; and the violation of any such regulation shall be deemed an
"offence against this Act and punishable as such."

Therefore His Excellency the Governor-General in Council is pleased, in virtue of the above cited provisions of the said Act, to make the following regulations, the same to come into force on the date of their publication in the Canada Gazette:

1. The Minister of Agriculture may make appointments of inspectors and other persons for the enforcement of the Act.

2. Any inspector charged with the enforcement of the Act may detain, for the time necessary to complete his inspection, any shipment of fruit, in respect of which he has reasonable grounds for believing that the marking of the package or the packing of the fruit constitutes a violation of the Act; such fruit shall at all times be at the risk and charges of the owner thereof; and any inspector detaining fruit shall give the owner, where ascertained, notice that such fruit is being detained, in storage or otherwise, as the case may be.

3. The despatch of a prepaid telegram or letter to the packer whose name is marked on the package shall be considered due notice.

4. No person shall, for himself or on behalf of any other person pack any fruit for sale, contrary to the provisions of the Act.

5. Any inspector or other person who violates any of the regulations made under the authority of the Act shall for each offence on summary conviction be liable to a fine of not less than five dollars, and not exceeding fifty dollars, together with the costs of prosecution.

(Signed) JOHN J. McGEE,
Clerk of the Privy Council.

FRUIT MARK'S ACT, 1901.

General Instructions.

1. Inspectors will visit orchards and packing houses to give information with regard to the Act. They will keep notes of what they observe during such visits.

2. Inspectors will examine fruit at all points in the district assigned them, whether at shipping stations, packing houses, orchards or elsewhere, as directed and as opportunity offers.

3. The Act does not provide for the inspection of particular lots of fruit at the request of buyers or sellers. When not under specific directions, inspectors will use their discretion as to where they can best employ their time within the district assigned them.

4. Inspectors will avoid anything which would delay unnecessarily the movement of the fruit, or which would interfere with the interests of those concerned in the fruit trade, except in so far as action may be necessary to prevent violation of the Act.

5. Packages which have been inspected are to be closed by the inspector and left in marketable order after examination, unless the owner prefers to take charge of such opened packages.

6. Inspectors will report to the Department by telegram regarding any particular shipments which in their judgment should be examined at the port of export or elsewhere.

Explanations for Guidance of Inspectors.

Sec. 3 (a.) "Closed Package" apples only to boxes or barrels.

Baskets even with close covers will not be considered closed packages to be affected by Sections 4 and 6 ; the packing of fruit in any package is subect to the provisions of Section 7.

Sec. 4. The words "plain and indelible manner" are to be taken as including all forms of marking which are plain and not readily rubbed out or removed.

Sec. 6. "Finest, best, or extra good quality." The following marks also are held by the trade generally to indicate this quality of fruit : "XXX," "Choice," "A. No. 1," "No. 1," "Fancy," "Selected," "Prime."

"Nearly Uniform" is to be taken as including any size of fruit except that which may be fairly classed as small for the variety.

"Bruises." Only such injuries as produce decay or otherwise materially lessen the value of the fruit for consumption, should be counted as bruises.

"Scab." Such as causes appreciable waste is to be considered particularly.

"Properly Packed." "Slacks" are to be considered as not properly packed if the condition is likely to result in permanent damage during handling or transit.

Sec. 9, "Falsely Marked." In case no marks appear, the inspector will ascertain who owns the fruit, and report to the Department. If marks are incomplete under Section 4, the shipper is to be notified of the requirements of the Act.

"Notice." After notice there need be no delay in carrying out the further provisions of the Act.

In case no name appears on packages, proceedings may be taken against the owner where ascertained; otherwise against the party in whose possession the fruit is found.

Sec. 11. In case of sales on commission the real owner will be first held responsible, but the commission merchants, who, after notice, handles fruit put up contrary to the provisions of the Act, will be proceeded against.

Sec. 12. If objection is made to entry or inspection the inspector must give written notice of his authority under the Act to the party objecting, enclosing a copy of the Act.

JAS. W. ROBERTSON,
Commissioner of Agriculture and Dairying.

Department of Agriculture,
Ottawa, September 18, 1901.

Prof. Robertson : The Fruit Marks Act happens to come under the care of my branch of the Department for administration. We have now ten inspectors, and one or two more to appoint in some of the more distant parts of Canada. The purpose of the Act as proclaimed in Parliament, and since then, was first of all educational. So far the work has hardly been educational ; it has been rather what I would call informational. There is quite a difference in life, I find, between acquiring information and imparting education. Inspectors have been chiefly employed in going to orchards and packing-houses and at the shipboard, giving the men who handle, free information on the Act itself and all methods of packing that have been found profitable and safe. The three inspectors in Montreal, and now there is a fourth in the Province of Quebec, have examined altogether 254 shipments. That is a considerable number, comprising over 33,000 barrels. On the whole, these men report that the packing this year is better in regard to what I shall call fairness of placing the fruit than it has been hitherto ; but there is room for very, very great improvement in that respect yet. There have been no prosecutions, because the inspectors had instructions that they should confine themselves at first to giving information, and when a parcel of fruit was found to be wrongfully marked or falsely packed, to inform and warn at once the man whose name was on the barrel. That has been done. I have a record of the letters written to every man on that subject. Now, in many cases, after the first warning was given there was fair reason why a prosecution should follow, but the instructions were at first to follow that course. Sometimes the stamp "falsely marked" was not put on the barrels until the shipper whose name was there had been warned, and then the stamp went on, not on every barrel in the lot, but on every barrel examined and found falsely marked. I need not explain that further ; I think you see what we are trying to do. I will read you a letter that came in recently like some others. This is dated on November 23rd from Aberdeen, Scotland, where those people live who are said to have been the Ten Lost Tribes, and who improve on the Jews' ability to make money. (Laughter) :

"We have just received delivery of two parcels of apics ex the Allan Line steamship Sardinian by Glasgow. They are as follows :" (I will not put the names of the men here now, we are not more than ready for that, but after this week the names will go broadcast. We said till the close of navigation we would simply be informational, but we have a duty, to carry out the will of Parliament, then there is to be an enforcement of the Act.) "These were bought on a guarantee of being equal to our highest requirements. Well, we see a large quantity marked in red letters 'falsely marked.'" (That man had been warned before, and the "falsely marked" went on his barrels.) "Now what did your inspection of these two lots reveal ? We also have examined some not marked thus"—(those were the ones on our records that were found the first time and the man written to, but not the stamp put on his barrels)—"and found them headed top and bottom with good fruit, while in the centre they were like eggs. Please reply quickly. This style of packing is a perfect scandal."

"We get many letters like that, I am sorry to say. The inspectors have been giving information. They have been carrying out the instructions of the Department; and the instructions of the Department to the inspectors from this day forward are that they should enforce that Act, if need be, collect evidence to follow up by prosecutions. I have no option. Parliament passed the law, the Department directed me to see that it was enforced, and that there was information given till the close of navigation, and now I want to have this said for the convention and the public through the press, that the instructions to the inspectors are to collect evidence and to enforce the Act, and then if the Act is found to be a wrong one or a bad one, Parliament can deal with it. Many of the inspectors are here ; I thought it desirable to have them here for the information of the fruit growers and others. There are, first of all, three requirements regarding marks. The package shall have the name of the packer ; shall have the name of the variety or varieties, and shall have the designation of the grade of the fruit. Some men have put on the letter "D" four times. Now, what that designates I do not know. It seems evident that there should be, in the interests of the shippers and the growers alike, some designation that is clear, that is correct in regard to definition, and has a

marketable and market value, a commercial use. Now, I do not say this as a recommendation, but it seems a desirable thing that we should make provision, by recommendation or otherwise, for at least this, that all apples packed in closed packages coming under the scope of this Act should have one of two things on them—either No. 1, No. 2, or No. 3, as one option, or XXX, XX, and X. Shippers are in the habit of branding either by figures 1 or 2, or of branding by X. Now, there can be no objection to a man putting on XXX if he wants to, if that will be better than No. 3. It seems to me desirable, as my personal opinion, that there should be another regulation, that that designation should have either one of those things, either have 1, 2 and 3, or X, XX, and XXX, to indicate the quality; and then if a man wants to supplement that by any other designation he likes, such as "selected," "choice," or "fancy," there could be no objection to that. Then if those apples are marked No. 1, and come up to the definition within the Act, they would go forward without any trouble and be accepted on the other side. One observation more. The designation of grade, I think, should also make provision for this. A good many apples are packed in orchards and intended to be repacked before they are shipped. For such fruit on the way from the orchard to a packing house or store, it ought to be sufficient to allow the words on "for repacking" ; that would take the place of a designation of grade until the fruit was repacked and properly sent out. In the packing itself there is the common way of having the fillers, and the followers and the facers. I have no opinion to offer in regard to the methods of packing, if they can be both in fact and in intention honest and honorable. If I were packing apples I would see no objection myself to putting the nicest looking apples on the face of the barrel. I say that, knowing I am saying it for the public, if you will—I would put the nicest looking apples on the ends of the barrel. That is Nature's way. You know what Drummond says, that "The Lord put the bloom on a woman's cheek for the perpetuation of the race." (Laughter.) It is best to have the nice side put upwards in every kind of face. Now even in the facing of barrels, as you know, a barrel does not look any better if it is faced with all large apples than if it has larger apples in the middle and medium or rather smaller towards the edge. That is a proper barrel face for shipment or for any other sale. I do not say—and I want to say this in explanation—that all apples must be perfect specimens. If the law required that all apples to be graded No. 1 should be all perfect specimens, then the law would require an impossibility in regard to profitable fruit growing—(hear, hear)—because if you take an ordinary well-conducted orchard, I think a man would have a high percentage if he had 10 per cent. in average years off any tree of perfect specimens—10 per cent that are faultless in form, that are perfect in color, that are true to shape, and are all the rest of it right. How much of a crop of any tree could you get for the Paris Exposition—perfect specimens ? At the same time, if you have marketable fruit, it is good fruit, first-rate fruit, but not perfect in regard to these definitions. Then perhaps the other 2-10 of the crop—that would make 3-10 altogether—would be first-class high grade fruit ; and then still more fruit would be of sound, useful, commercial quality ; so I think 4-5 of the fruit in an average year on any tree that has been sprayed properly and well nourished and well cared for might be what you might even call No. 1 fruit ; but that should go into a barrel as it was on the tree. I do not remember that I ever saw a tree where you would find fruit on one corner. It seems that Nature spreads the fine fruit all about, and some not so good close by, and if it is like that barrel, with all the pretty apples on the face, it should not be charged against us as a nation in this matter, and I think there would be far more profit come to you as a people. (Hear, hear.) My inspectors and myself had some mail sent on here, and one letter came from Glasgow this morning saying that they had found that the apples in boxes for the Exhibition had kept ever so much better than the similar apples for the same Exposition kept in barrels—so they had apples at the Exhibition when it closed, for thirteen months in boxes, that had kept first-rate, but the apples in the barrels of the same sort had very largely decayed. Now, even for safety of carriage a box seems better than a barrel, and certainly for distribution all over the country through, a box will be a better package for the household. It will help our trade a good deal to do that. I have given the

inspectors perfect liberty to give you every information in regard to what they have found in their work. They are here not to offer opinions on the Act—that is the only limitation I have put on their own lips or mine—that the Act is the product of Parliament, and whatever you men, the free and unbiased electors of this country, may say about it, we men, who are charged with its administration, may not have any opinions to express, and if anyone thinks the action of the Department the next three months is rather harsh, well, we are the instruments and the obedient servants of Parliament to enforce that Act, and rightly or wrongly, as you may think, in regard to the fruit trade we are going to obey our instructions, and then when Parliament meets, if the country thinks the Act is wrong you can correct it in Parliament. I said to the inspectors, "Donot express any opinion about the Act, but give any information you wish about the inspection." I am greatly hopeful in the last two or three years, from attending conventions like this and others, that we will have lectures like Mr. Hutt's and Prof. Waugh's and others—I single them out as being the very kind of thing that every school boy and school girl will get in their days—(hear, hear)—then how wisely and well they will be brought up to make this a great country in every sense.

Mr. George Fisher : Were those closed or ventilated cases that were better than the barrels ?

Prof. Saunders : They were open.

Mr. Demill : I happened to be there; I was with the Commissioner, and I saw him open some of the cases, and they were ventilated cases in Paris .

Mr. Eben James: Regarding the Fruit Marks Act, I would like to ask Prof. Robertson what objection could be made to using the word "straight grade." At the opening of the season a great many of my clients and others held a little conference and wanted to know what terms could be used, because in picking apples in the orchard, especially where you cannot get the best of help and experience, you often take what you might call tree run ; you do not put in anything very bad, at the same time ones and twos are mixed up, and it would be a great injury to the shipper to call them No. 2, and they could not be strictly called No. 1, and so we adopted the word, "straight grade," and that has been going on until one of the inspectors refused one of my shipments, saying that they had ceased to consider the term "straight grade." I happen to be the lucky man that was referred to in the letter from Aberdeen. I know it, because the party told me he had written Prof. Robertson about it. There are two sides to that question. Those people I ship apples to in Aberdeen are people of comparatively poor standing, and I do not ship them any apples unless I get an advance on them, because when the market goes a little bit down they refuse the draft, and if it is up they threaten to sue me if I do not fill the bill. The man who shipped the apples is W. R. Stanley of Logan. The quality has been good right through. In proof of that, I sold three cars to Winnipeg, and the man wanted more at higher prices than I sold to this Aberdonian. Some apples are shipped forward on commission at Liverpool, and I can show catalogues where they sold from 22 to 28s. Now, if there was such fraudulent packing they would not sell that well. Those people have accepted all the drafts, even those that they did not have deposits against, and are wiring for more. Of course they wrote me the other day, and said they wanted me to make a claim on the shipper, and they were claiming £80 damages, or something of that kind, on a possible profit that I was getting of 25 cents a barrel, and that is the class of men who write. While the inspectors are good fellows and are doing their duty as well as they know how, there is a good deal of unfair shipping. I know hundreds of cars that those people have shipped via Portland that have never been examined and have been branded Double Extra, XXX, and everything else, and the sales on the other side have only gone to prove that the stuff was not packed right ; and here is a loyal people who want to patronize Canadian steamers and everything Canadian, we have got an army of men watching what goes via Montreal, while the fellow that ships by American ports goes Scot free. I have been hit several times, and I feel very keenly about it. There is another case that I wish to submit where I think I am right, and the inspectors are wrong. He says, "We took the shipper's name of those that were

marked falsely packed." I immediately instructed them to withdraw them from sale, because we would lose a dollar a barrel for a brand that had been put on a few. (Reading.) "We took the shipper's name of those marked 'falsely packed,' but they, the inspectors, exceeded their authority under the Act by marking some of them 'falsely packed,' as the packing in all instances seemed, even when the barrels were taken out, to be perfectly honest. In such a case, surely 'not up to standard' would have been a better designation, as all we could find wrong was that the fruit was slightly mouldy. Surely this has nothing to do with the packing. We drew the Government man's attention to this here, and he agreed with us." Where do we come in with a case of that kind? Under the Act, I suppose, we are just as liable to be fined a dollar a barrel and jumped on when it is not our mistake. As a matter of fact, the Government man was with us on the other side, but I suppose it is as much as his job was worth if he would oppose the inspectors on this side. What protection have we got against this? And yet we put out our hard money in this country and try to get it back. We have got to have some protection and some fairness. There is another part of it. One of my shippers, Henry Tuthill, of Thornbury, one of the oldest and most independent shippers of Canada—he and D. L. Simmons the pioneer shipper of this country—these gentlemen joined their interests this year and shipped for us under their own brand, and they have got two very well established brands in England. Mr. Simmons' apples have gone on under the D.L.S. brand, and one man shipped to Watkins of Liverpool and the other shipped to Adams, and they divide the cars equally and keep from beating down prices, and they know very well we are packing again, and will send home most of the money and get the business, and they divide the cars equally as far as they are able. Now, ever since Simmons has been in business, Talman Sweets have been shipped as Golden Pippins, and they are known to the buyers in England as Golden Pippins. Well, this year Farwell & Saxon shipped, as they always have done, and his Golden Pippins were marked "falsely branded" in Montreal, and the other fellows had gone Scot free. Now, why that discrimination? I should like to know why one man's stuff should be let go free as packed all right, and the other man is jumped on? So, what was the result? For the time being that they were shipping these Golden Pippins they put them on under the brand of D.L.S., and there was nothing heard about them and everything was smooth. (Applause.)

Prof. Robertson: Of course I am not going to have any discussion. I have nothing to offer of an opinion except this, that the report of our inspectors on the apples shipped under the name of Stanley, of Logan, says it was the second offence, and the apples were as bad as described in that letter. The apples were badly packed, falsely packed, and we will stop that in Canada if we can. (Hear, hear, and applause.) The inspectors so far have been collecting evidence, and they always got the testimony in Montreal of three independent men. Their salaries are not at stake; their positions are at no risk; and anyone who thinks that a Government official is liable to be cashiered unless he chimes in with the trend of public opinion is mistaken. Our men are not built that way. We have the independence of doing right, and we are going to do it, and you commercial men who are in the business for a speculative purpose have done it serious harm in past years by sending fruit that has been complained of everywhere, which I myself know, for I saw this thing in that country and this. We should do the business honestly, or else stop the business and let others who will do it. (Hear, hear.) My chief in this matter is Mr. W. A. McKinnon, who is appointed specially to administer this Act with these inspectors, and we hope to administer the Act with a spirit of fairness, without any regard at all to any extraneous matter except the honest packing and the honest marking of Canadian fruit.

Mr. Eben James: May I ask if Talman Sweets can be shipped as Golden Pippins?

Prof. Robertson: Quite a common thing; that variety is known under both terms.

Mr. Eben James: I am glad the inspectors are here, because they will know it. Another thing, I just appeal to the public in this respect; we have handled this year close on 40,000 barrels on various cars, and one man is packing several thousand barrels.

Now I proved by my catalogue that these Stanley apples were packed in the very best way. We all want the apples packed right, and so does Stanley and everybody, but how can you get it all done right? There is always some barrel that will go shy in finishing up, and what was perhaps packed as a barrel of Spys, if they need a peck to fill up and put in something else, all these things come up against the law and hard facts, and it is very hard to interpret on the packer who is packing in an individual orchard, and in nine cases out of ten the strength of the chain is the weakest link, and they pick on a barrel of apples that is finishing up; but they only found in that lot seven or eight barrels that were marked "falsely branded," and the apples went through in good shape. In shipping apples from the storage anybody knows that there is no danger, because you have lots of apples to work on, and you can grade up, but in the orchard, packing in the fall is a very hard matter, and there is always an occasional barrel that will go through. We have no desire to be dishonest, because we buy the apples by the barrel in many cases, and it is no interest to the shipper to ship poor stuff, but it is to the best interest of all concerned to pack honestly. Anyone knows that a man who is an A1 man is not looking for a job for three months of the year, he is not looking for a job to go about among rain and wet and pack apples in the fall, and the C. P. R. excursions were and inducement to men to go to the west, and there is a dearth of farm labourers from one end of the year to the other, and we have to employ all manner of labor, and the law must be lenient with us. We are men who are putting up our good hard money. If we are molested we will have to seek other fields, where we will not be molested. I understand the word "straight grade" we can use?

Prof. Robertson: So far, until the law is changed or amended, the law lets us accept any designation of grade.

Mr. Eben James: Then the inspector was in error?

Prof. Robertson: I think one thing I did not make clear, that there was no such intention or practice as taking any action on a single barrel in a lot, but if any one barrel is found to be wrong or bad the inspector goes on and finds more. If he finds more he brands only those he finds. Now in one of these cases there were eleven barrels examined, and they were all found bad, and in another case there were 7 examined and 6 bad. I am sorry if the inspectors should be so accidental in hitting on these bad barrels.

Mr. E. D. Smith: When he examined those barrels and found them bad, would not the inspector go on and examine all the rest of that man's shipment?

Prof. Robertson: He would in case of prosecution, but this year for the sake of information they did not examine the whole lot. I have every sympathy, and we all have, with the difficulties of this business, but we want to begin to stop some of them, at least such as come under the eye of the inspectors. I have been told a thousand times the last two weeks, "That is very well; you got the Act passed at the request of the Fruit Growers' Association, Parliament gave you power, and you have been putting up a huge game of bluff this year." I like to play bluff, but I like to "call" occasionally—(laughter)—and I am going to call. (Applause.)

Mr. R. J. Graham (Belleville): I think the Fruit Marks Act is all right if it went a little bit further. If we could have the fruit inspected at the point of shipment and a certificate from the inspector that the fruit is No. 1, or No. 2, or No. 3, as the case might be, it would materially help us in our export trade, because then there would be no chance for kicking at the other end of the line. I think that we who are in the export trade could very well afford to pay for having the apples inspected, a reasonable amount, $5 or $10, or $20, a car. I know, for my part, I would prefer to do that, and if I sold a car of apples as No. 1 Standard and got a Government certificate for it, my responsibility for that fruit would cease, and it would settle all this dispute between the Aberdeen man and the man this side, and there would be a finish to it; but unfortunately the Fruit Marks Act, as I understand it, does not permit the giving of certificates of that kind by the inspectors, and therefore we cannot sell with a certificate of inspection. I think it is a capital plan to have this fruit inspected, and those who are

at fault should pay the penalty. I understand the difficulties of the situation somewhat, having some 60 or 70 men packing apples for me this fall. I felt that I was responsible for their work, and, although I was not able to see what they did, I could see that I must take a great deal of responsibility in employing men of that class. You turn around and say, "Well, only employ men who are responsible and who would make good this loss;" but you know it is impossible to get 60 or 70 men to take charge of gangs, to pack apples in an orchard, that would put up for any loss; they could not do it; they would not do it, and the result is the responsibility must come back on me. I feel that it is a serious thing to be responsible for that sort of thing, but I do not see any other way out of the difficulty. Of course apples that come out of the fruit house it is easy to be responsible for, because you can control that sort of thing; you cannot grade up fruit in an orchard the same as you can in a fruit house, and in order to be safe at all you necessarily have to come back and grade all your fruit No. 2, and of course it is a difficult situation to be placed in. I do not know how the thing will work out, but if we could in some way have enough inspectors so that when a car is being loaded we could pay a reasonable amount to have that fruit inspected at the point of shipment, then our responsibility would cease, and we would have direct control of our subordinates who are packing our apples in our orchard, and we would get back on them before serious damage was done. (Hear, hear.)

Mr. Eben James: I got a letter some time ago about branding No. 2, and I understand from one of the inspectors that the question of branding No. 2 was to come up here while Prof. Robertson was present. The old saying is, "It is a poor thing to cry rotten herrings," and the dealers in the Old Country do not like apples marked No. 2—not but what they know the quality of the apples all right, for some apples No. 2 are better than apples No. 1; at the same time when an apple goes in branded No. 2 the dealer says, "That can't be much good, the man himself says it is only a second." Here is what they write:—"Referring to branding apples, we think you should tell your shippers not to brand anything you may call your No. 2—they are about as good as each other. No buyer wants a party's goods so described, and we do not think it is to the seller's advantage to advertise the inferiority of his goods, which it probably means. A circular for private circulation on these lines should be given." I will just say right here, if I go down to Maine and operate, or parts in Missouri, or any other part of the States, a man has not to put No. 2 on his apples; if his name is on and he fulfils the law by making the top a fair representation of the interior, I think that ought to be pretty near enough.

Prof. Robertson: Prosecutions that have been even threatened, and that likely will be taken by the inspectors, have never been on any such point as whether the designation of grade was a little bit too high or too low. It has been on that palpable and evident fraudulent practice of putting rubbish in the middle of the barrels which that letter complained of. That is the thing that we all want stopped. There is no intention or desire to put a hard interpretation on the law, that that thing is nearly No. 1, but not quite. There is no action taken on that, hardly even by writing letters; but it is this other evident, palpable fraud of putting stuff in the middle, and it is our intention to stop that. (Hear, hear.)

Mr. D. J. McKinnon: I have had some experience in shipping, and I think that the very fact of pledging every shipper to put his name in plain letters on a barrel is a sufficient guarantee to get over a great deal of the past difficulty from which a practice that many shippers have—and I am going to speak out plainly and say that that is the practice of a packer named here to-day—anything that he had very good he would put his own name on, but if they were No. 2, he says, "put up by Mac," or by Jack Somebodyelse. That is what we want to stop. (Laughter.) Everything that goes to Liverpool I put my own name on in full, and if everybody else had done that we would not have had the trouble.

Mr. A. E. Sherrington (Walkerton): Suppose a gentleman buys apples and he employs a man in another section operating for him, and he sends a man on to pack, even cautions the man by letter to be careful in packing under the eye of the operator. He re-

tains those letters in his pocket, instructing the packers to go on and put up apples that are not right, and those apples are not put up honestly. Who is to suffer for it ? Why not the operator or the packer ? And how are you going to get at him ? He is not worth anything. The only way is, you will have to imprison him to get satisfaction out of him. I know a case of that kind in our section. The man was in a terrible way, expecting to be prosecuted for this fruit that went out. I feel positive they were not put up right, because I know the man, and he is not capable of doing anything that is right. There is the difficulty—one man will suffer for another man's fault.

Mr. W. A. McKinnon (Chief Inspector) : I should be very glad to answer any questions or give any information as to the working of this Act, and our inspectors who are present will be able to give much more definite information regarding their experiences in various parts of the country. I may say that several objections have been met with in different parts to the various provisions of the law. If we took them in order we would find the first fault with that provision requiring the name and address of the packer to go on every barrel. If the packer has been used to shipping his first-class fruit under his own name, and has thereby obtained a market for that fruit which he does not wish to injure by shipping his second grade under that same name, it is a possible solution that he might mark the second grade so conspicuously, either No. 2, or if that is found dangerous, with XX.; he might mark it so conspicuously that no person would be misled into thinking that he was buying the old reliable No. 1 brand. Just in that connection, I would mention that I have looked through some account sales of this present year, and observed particularly the result where fruit was marked No. 2, and where fruit of the same variety sold at the same time and coming from the same part of the country was marked with XX, and I found that as a rule there is absolutely no difference in price, therefore I do not think it is always the experience that marking No. 2 fruit in plain figures is an injury. If XX, or if a pair of crossed flags, or if anything else is understood by the buyer to mean No. 2, what is the difference ? I cannot see. With regard to Sec. 4 (c) requiring a designation of the grade we have met the objection which I think Mr. James has stated this morning, that it is hardly fair, and is an infringement to the personal liberty of the grower, if he is not allowed to put his product, whatever it may be, on the market to sell on its merits, therefore the shipper would rather sell a second grade. I notice there is no objection to calling No. 1 by the best name possible, but a second grade he would like to sell only on its face. Possibly there is something in that. That is for you gentlemen to discuss. I will only say it appears to me that the second grade will do just as well if it is described on the barrel as if it has to be ascertained by a complete search through the barrel, and that a great deal of time and trouble would be saved if there were on the outside of every package a clear indication which would show what was within the package. With regard to section 6, and which describes the regulations for fruit that is declared to be the finest, the best, etc., we have two objections : first, that the standard set is too high in requiring 90 per cent. to be free from blemish. That objection we find chiefly in Ontario. The other objection is that 90 per cent. is quite too low a standard required for No. 1 Canadian fruit; that objection we meet in Nova Scotia. In regard to Sec. 7, which has most to do with the packing, there is a good deal of objection expressed in various ways, sometimes more frank than others. A good many say that there are purchasers, whether in this country, in the west, or in Chicago, or in England, who demand a face which will be somewhat superior to the bulk of the package Now it is for us all to consider perhaps why they wish a better face than the contents will warrant. It may be that if the ultimate purchasers, the consumers, were consulted, they would not ask for that same method of facing up the fruit. One letter has been read this morning with regard to some fruit which is alleged to have been branded "falsely packed." Now I do not mean to indulge in any hard speaking, but it is a fact that none of our inspectors have authority to mark a package "falsely packed," and I think it is absolutely true that no inspector has ever marked a package "falsely packed.' The authority conferred by the Act only extends to fruit which is falsely marked. In this very letter the writer takes exception to the brand "falsely

packed," which may or may not have been correctly reported, and says that the package should have been described as not up to standard. Now you will observe that there is not a very great difference between "not up to standard" and "falsely marked." Falsely marked, means that fruit which was marked of finest quality was not of finest quality, and therefore was not up to standard ; therefore it seems to me that our inspectors have been acting in accordance with the writer of this letter. The question has been asked where we are to get experts to pack fruit in accordance with the requirements of this Act. It appears to me that the solution may come to be that our farmers and growers will be the experts who will pack their fruit properly. (Hear, hear.) With reference to the designation "Straight grade" I may say that, having met this designation early in the season, I have taken occasion during the last two or three months to inquire everywhere where there were two or three fruit men gathered together what the meaning of that expression was, and I never yet found as many as two men, if there were only two, who agreed in their description of that word "straight." I think, therefore, it is at least a question whether the word "straight" is a designation of grade that will be recognized by the public generally. "Orchard run" is another designation which perhaps is more significant than "straight grade," but it is perhaps unnecessary for me to say that I agree very heartily with the suggestion that we should, if possible, eliminate some of the many designations which are used as designations of grade. Our inspectors at Montreal would perhaps be able to tell you some peculiar marks they have found on barrels. I think, if I remember rightly, there were at least fifty different expressions used to designate the grade of fruit in the barrel. Now for any trade that had to be conducted on a large scale it surely ought to be well to have a business-like, plain, English method of designating the quality of the fruit.

Mr. G. C. Caston: We expected that there would be a good deal of difficulty. These reforms are not accomplished without it, and when this Association grappled with the question two years ago and appointed a committee, I had the honour to be one of them, and there are several other gentlemen here who were on that committee—Mr. E. D. Smith, M.P., Mr. Woolverton, Mr. Fisher, Mr. A. H. Pettit, and others—we thought it was going to be a comparatively easy matter to frame a bill that would meet the case ; but when we met down there at Grimsby we wrestled with it a whole day, and we had not successfully grappled with it, because when we came to consider it, innumerable little details came up that were difficult to settle satisfactorily, and it will be some time before the thing gets into smooth working shape; but I think that one of grandest steps in our advance is, as Mr. D. J. McKinnon said, requiring every man to put his name on the package for sale. That should be enforced in every case. Whether it is No. 1 or No. 2, or I do not care how many filagrees he may put on the barrel, he should put his name on the package, whether it is for the home or the foreign market. I want to call attention to the fact that we are allowing a very important trade—perhaps we do not comprehend the importance of it within the whole Dominion, I mean the home market, the Western market, the Manitoba and Northwest—to slip through our fingers, and it is being taken by the people of the Western States, and from the Produce Exchange in Winnipeg we get the report that the apples sent there from Ontario, taken as a whole, are a disgrace to the Province, and the people of Washington and Oregon are taking that market from us. We should develop our Western markets for fruit among the people that are growing our hard wheat, for their money is as good as anybody else's. (Hear, hear.)

Mr. Eben James : We have heard a great deal about those seconds, but I have had an order from Winnipeg for No. 2 at $3 a barrel. We can market our No. 2 a year like this if we only pack them properly and face them up.

Mr. Boulter : You can mark it No. 2.

Mr. James : Of course you can.

REPORT OF COMMITTEE ON PACKAGES AND APPLIANCES FOR THE USE OF FRUIT GROWERS.

We, the Committee appointed to inspect and report upon exhibits of new appliances for the use of fruit growers, beg leave to report as follows :

We have examined the fruit grader invented and shown by Mr. A. H. Pettit of Grimsby, and in our opinion, judging from its simple construction, ease of operation, careful manipulation and the thorough manner in which it does its work, it is the best device for the purpose we have yet seen.

We have also examined the Expansive Tree Protector, and from its construction and easy adjustment to any tree we think it would be a desirable thing for the purpose, but not knowing the nature of the poisons used, whether they are attractive or repelling to insects, and not having seen it in operation, we are not prepared to say anything in regard to its real value as compared with burlap or other material. We would recommend that it be tried at our experiment stations and reported upon at our next meeting.

We also notice in connection with the well-known and excellent Spramotor, an improved Vermorel nozzle, which facilitates the cleaning of the nozzle, and also a hand valve which replaces the old stop cock.

The samples of fruit packages manufactured by the Ontario Fruit Basket Company have been examined and, in the opinion of the committee, their construction, lightness and apparent durability will make them a great improvement over the baskets formerly used. They also possess the advantage of being stitched with wire instead of being nailed, which makes them stronger. There is also a simple contrivance for fastening the cover without hooks.

(Signed) A. M. Smith.
J. E. Orr.
J. S. Scarff.

THE PROMISING NEW STRAWBERRIES.

By E. B. Stevenson, Jordan Station.

Some one has said, "doubtless the Almighty could have made a better berry than the strawberry, but it is certain he never did."

On account of the crowded state of our programme and the other very important subjects yet to be presented to the meeting I shall endeavor to be as brief as possible, omitting some things I might bring before you did time permit. I shall confine myself strictly to the subject given me, viz., "Promising New Strawberries."

I am pleased to say there are a number of them. There was a time when it was maintained by strawberry men that you could not get a staminate or perfect flowering variety that was as productive or as large as the pistillate varieties. It was held that the strain on the plant in producing the pollen weakened the plant, and the staminate variety for that reason could not produce as large berries, nor as many. We do not hear that now, because we have perfect flowering kinds that are producing as large crops of the finest berries as ever pistillate variety did. In fact, most of the kinds that are most widely grown for market at the present are staminate varieties. The promising new sorts are also of that kind.

The progressive grower is always on the lookout for something better than he has. One of the best new varieties is "August Luther." It was claimed for it that it was earlier than Michel's Early. It proved to be on my ground the past season, the only year I had it in fruiting. It was as follows : I planted "Michel's Early," "August Luther" and "Johnston's Early" side by side; same number of plants in each row on same soil; same treatment. The Michel's was in bloom first by two or three days, but the August Luther berries were fully ripe two days before the Michel's and four days before the Johnston's Early. From this I judge that it takes the August

Luther several days less time to mature and ripen its fruit from the blossom time than it does the Michel's Early. That I believe is a distinct advantage, for, being in bloom two days behind the Michel's Early it may miss some of the late spring frosts that sometimes do so much harm to the Michel's Early, and then ripen its fruit much earlier than the Michel's under these conditions; but it appears to be two days earlier even when no late frosts come.

The August Luther has a perfect flower, is healthy, as vigorous a flower as the Michel's. The plant in my soil is more productive than Michel's. The berry is good size and conical in shape, somewhat like the Michel's, but larger, has a slight neck; ripens all over at once. I believe there is a future before it as an extra early market berry.

Another very promising variety that comes very soon after the August Luther as to time of ripening is the "Senator Dunlap." This is also a perfect flowering kind. The first ripe berries were picked only five days later than August Luther and three days after the Michel. It grows very much like the old Crescent Seedling; resembles it in many points; is a free grower, making many plants. If let grow would make a very wide matted row. I am convinced even after one year's fruiting and from reports received of it from other sections, that it is the coming market berry. It resembles in shape and color the old "Wilson's Albany" berry; is solid, very firm; fine, dark color, and very large for so early a berry. I think it will be a good shipper. I believe market growers will report after a time that the Senator Dunlap is a great acquisition.

Not to take up too much of your time, I would like to mention one more promising new strawberry, viz., the "Miller." This also has a perfect flower. The plant is very large—as large as any I know of—and very productive. The berry is very large, and the first ripe were picked June 21st, or six days after the Senator Dunlap, growing side by side with it. The berry is bright red and borne on very strong fruit stems. It somewhat resembles the "Glen Mary." It is medium in firmness. It was ripe one day before the "Williams," is much larger, and is a variety well worth a trial by all market growers. For reasons that we do not fully understand a variety that does extremely well in one place will perhaps not do nearly as well in another place; and in a third locality will be of little or no value at all.

Q. Is the Clyde a good market berry?

A. Yes, for near market; perhaps the best. It is being very largely planted.

Among the new kinds, "August Luther," "Senator Dunlap." "Miller." "New York," "Gibson." "Sampson," "Uncle Jim," "Monitor," "11.59 P.M.," "Bennett," "Kansas," "Robbie," "Nettie," "Joe," "Carmi Beauty," "Hero," "Porto Rico." "Marie," "Honest Charlie," "Clyde No. 800," we believe will be found several that will stand well to the front, and from the market growers' standpoint will prove profitable.

A Delegate: Have you found the ground too rich for the average strawberry?

Rev. E. B. Stevenson: No; I do not think you can make it too rich.

THE AMERICANA AND NIGRA PLUMS.

By W. T. Macoun, Horticulturist, Central Experimental Farm, Ottawa, Ont.

I have prepared a paper on the Native Plum. This fruit is a very important one in the northern parts of Ontario, and also in the Province of Quebec. You will be surprised to learn that we can put the native Canadian fruits on the market from the 1st of August to the 1st of October. Where people are willing to eat these plums—and some of them are very good indeed, and worthy the name of plums—they can be sold at a time when your plums from Western Ontario cannot be had.

The European and Japanese varieties of plums are so uncertain in climates as severe as that at Ottawa that they should not be planted for commercial purposes un-

less the orchard has good protection, and even in that case there are but few, if any, that would give satisfaction.

There is no doubt that in the Ottawa district, and where the climate is similar, the main dependence must be on the Americana and Nigra plums. These varieties, though not equalling the European plums in richness and tenderness of skin, afford good substitutes where better kinds cannot be grown successfully. The Nigra, or native plum, is thinner in the skin than the Americana, but not as rich. The fruit is also usually badly affected by blight (Cladosporium carpophilum, V. Thumen), and unless thoroughly sprayed does not mature, the blight affecting it when it is nearly full grown, causing it to wither and fall to the ground before maturing. The Nigra plum also more affected by curculio than the Americana, which lessens the crop very much.

Although there are several species of plums that are natives of America, these two furnish most of the varieties that are profitable to grow in Ontario and Quebec.

The species found in Eastern Canada is Prunus nigra, Ait, the tree of which is distinguished easily at a glance from P. americana, Marsh, in being darker in the bark, and with a much stiffer and more upright habit than the latter. The fruit of P. nigra ripens, as a rule, earlier than that of P. americana, and is usually more evenly covered with red. Some varieties are good in quality, but, as a rule, are not as high flavored as those of Americana. The species, however, varies considerably, and some times is is difficult to decide whether a variety is P. nigra or P. americana. The trees bear heavily and regularly. The species called P. Americana is not known to occur in Canada, although the form of wild plum growing in Manitoba is much like it, but is intermediate in some characteristics between the two. Its range is from New Jersey to Montana. The named varieties which have sprung from this species comprise most of the best kinds now offered for sale. This tree grows from 10 to 20 feet in height, is of spreading habit, and is usually quite hardy where the native species grow. It bears heavily and regularly, as a rule, and the fruit of the best varieties is of good size and attractive appearance, and, although not equal in quality to the best European plums, is juicy, sweet, often high flavored, and at all times refreshing. The skin is sometimes more or less acrid, but this is not apparent when eating some of the best varieties, although when canned or preserved, it sometimes develops, though often it does not. P. americana does not suffer from blight to any extent, and this is an important reason why varieties of it should be planted instead of P. nigra, unless the trees of the latter are properly sprayed.

The following technical descriptions of the two species, made by Waugh, give their distinguishing characteristics in greater detail and accuracy:—

"P. americana, Marsh.—Common Wild Plum. The type distinguished by entire calyx lobes, which are pubescent on the inner surface; stone turgid; leaves oval or slightly obovate; petioles mostly without glands. Tree spreading, ragged, thorny, 8 to 20 feet high; flowers large, white, on slender pedicels; leaves very coarsely veined, never glossy or shining; fruit more or less flattened upon the sides, firm and meaty, the skin tough and glaucous and never glossy, ripening through yellow to red. Occurs wild from New Jersey and New York to Montana and Colorado. It varies southward, in Texas and New Mexico represented mostly by the variety mollis.

"Var. nigra. Canada Plum, Red Plum (P. nigra, Ait., P. americana T. & G. and 6th ed. Gray's Manual. In its extreme forms easily distinguished by the glandular-serrate calyx lobes, glabrous on the inner surface; compressed stone; broadly oblong-ovate to obovate leaves with petioles bearing two glands. Flowers, large, white, with short thick peduncles conspicuously marked by the scars left by the falling of the bud scales; pedicels dark red, slender, glabrous; calyx tube broadly obconic, dark red on the outer and bright red on the inner surface; fruit oblong-oval, orange-red; stone nearly oval, compressed. Occurs wild from Newfoundland west to Rainy and Assiniboine rivers in Canada, and commonly in the New England States, where it is found along roadsides and in waste places."

The plum has been well studied by Prof. F. A. Waugh, of Burlington, Vt., and through his work the fact has been established that practically all varieties of American plums are self-sterile. In other words, there would be no fruit in an orchard

containing a number of trees of one variety only, unless the wind or insects carried pollen of other varieties to fertilize the flowers. This knowledge is of great importance to the fruit-grower. It is another indication that "nature abhors perpetual self-fertilization." While a variety is self-sterile in itself, if it is fertilized by another self-sterile variety, fruit will be formed, and vice versa. It is necessary, then, if good crops are to be obtained, to have more than one variety growing in the orchard, to have the varieties bloom at the same time, and to have them of the same species, if possible; and, failing that, to have the species as closely related as possible.

At the Central Experimental Farm there are now 76 varieties of American plums, a large proportion of which have fruited, and following are descriptions of the best of them, with names of the varieties which may be used as pollenizers to fertilize them:—

Aitkin, nigra.—Ripe August 22, 1899, and August 24, 1900. Fruit large, oval, suture merely an obscure line; color uniformly deep red all over; flesh deep yellow, juicy, sweet, but not rich nor high flavored; stone large, flat, semi-cling; skin rather thin, tough and astringent. Quality above medium. Tree a vigorous upright grower and a medium bearer. As grown here, the only good points in this plum are its earliness and attractive appearance; but earliness is a very desirable characteristic, and it is worth planting on this account. Cheney, however, which follows it in ten or eleven days, is so much better in every way, and for home use, especially, that it is much to be preferred.

Cheney, nigra.—Ripe September 2, 1899, September 4, 1900. Fruit large, oblong to roundish; suture distinct; color uniformly purplish-red all over; flesh deep yellow, juicy, sweet, rich; stone of medium size, flat, cling; skin moderately thick, tough, without stringency. Quality good. Tree upright, vigorous, and a good bearer. This and Bixby are the two best early plums which have fruited here, and they should both be planted.

Bixby, americana.—Ripe August 31, 1899, September 6, 1900. Fruit large, round; color yellow, more or less covered with red; bloom rather heavy; flesh deep yellow juicy, sweet, rich; stone of medium size, almost free; skin thick but tender and without astringency. Quality very good. Tree spreading, vigorous, and a heavy bearer. This is the earliest good plum of the americana group which has fruited here. It is well worth growing on account of its earliness, productiveness and quality. It does not ripen its fruit as early as some, nor is it very firm, but on the whole it is a good plum.

Gaylord, americana.—Ripe September 6, 1899, September 13, 1900. Fruit almost large, roundish, somewhat heart-shaped, suture distinct; colour yellow, almost covered with deep red, with a bloom; flesh deep yellow, juicy, sweet, rich; stone of medium size, free; skin moderately thick and fairly tender; slightly astringent. Quality good. Tree spreading, vigorous, and a good bearer. A fine plum.

New Ulm, americana.—Ripe September 11, 1899, September 18, 1900. Fruit large, nearly round, somewhat heart-shaped; suture distinct; color yellow, more or less covered with pink or purplish-red, sometimes the surface has a mottled appearance when the yellow shows through the red; bloom moderately heavy; flesh deep yellow, juicy, sweet; stone of medium size, cling. Skin thick and tough, but not astringent. Quality good. Tree vigorous, of a low, spreading habit, and a good bearer. This is a firm plum, and should prove a very useful sort for shipping.

Wolf, americana.—Ripe September 14, 1899, September 18, 1900. Fruit large, roundish to oval; suture fairly distinct; color uniformly dull deep-red all over; bloom moderately heavy; flesh deep yellow, juicy, sweet, rich; stone large, cling; skin thick and tough, and but slightly astringent. Quality good. Tree somewhat spreading, vigorous, productive. The Wolf, as grown at the Experimental Farm, is different from that described by most writers; one great difference being that the one grown here has a cling stone. There is no other plum in our collection, however, which resembles it, hence the name will not be changed for the present. It is one of the very best of the American plums. The Wolf described by others is also said to be one of the best. When it fruits here the two will be compared.

City, americana.—Ripe September 14, 1899, September 18, 1900. Fruit large, round; suture distinct; color yellow, almost covered with red, but not of a very attractive shade, bloom moderately heavy; flesh yellow, juicy, sweet; stone of medium size, free; skin thick, moderately tender, slightly astringent. Quality good. Tree low growing, spreading, vigorous and productive. The fruit of this variety is firm, and should ship well. It is spoken highly of elsewhere also.

Silas Wilson, americana.—Ripe September 18, 1900. Fruit very large, roundish; suture distinct; color yellow, more or less mottled with purplish-red; bloom moderately heavy; flesh yellow, juicy, sweet, rich; stone above medium size, semi-cling; skin moderately thick, fairly tender, not astringent; quality very good. Tree spreading, vigorous. This is the first year that this variety has fruited here, but if it is productive it should prove one of the most valuable. It is the largest and best in quality of all the American plums which have yet fruited here.

Stoddard, americana.—Ripe September 19, 1899, September 18, 1900. Fruit very large, almost round; suture distinct; color yellow, almost covered with purplish or coppery red; bloom moderately heavy; flesh yellow, juicy, sweet, rich; stone large, cling; skin thick, but moderately tender, not astringent. Quality very good. Tree vigorous, spreading and moderately productive. On account of its size, appearance and quality, this is one of the best of this class of plums. Next to Silas Wilson, it is the best in quality of those which have fruited here.

Hawkeye, americana.—Ripe September 22, 1900. Fruit large, roundish; suture distinct; color deep purplish-red; bloom heavy; flesh deep yellow, juicy, moderately rich; stone large, flat, cling; skin thick and tough, but not astringent. Quality good. Tree vigorous, spreading, productive. This variety resembles Stoddard very much, but is not as good in quality. It is, however, a very valuable sort.

Wyant, americana.—Ripe September 19, 1899, September 22, 1900. Fruit very large, irregular, roundish, somewhat flattened; suture distinct; color yellow, but well washed and mottled with dull deep red; bloom moderately heavy; flesh yellow, fairly juicy, sweet; stone large, free; skin moderately thick and tough, astringent; quality medium. Tree vigorous, spreading. Has not proved productive here, but has elsewhere.

American Eagle, americana.—Ripe September 22, 1900. Fruit large, roundish, somewhat oval; suture distinct; color deep purplish-red; bloom moderately heavy; flesh yellow, juicy, sweet; stone of medium size, cling; skin thick and tough, not astringent. Quality good. Tree vigorous. This is the first year that this variety has fruited here, but it promises to be a very useful sort. It is spoken of highly by others.

Hammer, hortulana.—Ripe September 25, 1899, September 27, 1900. Fruit large, roundish; suture distinct; color dark, dull red; bloom heavy. The bloom brightens up this variety and gives it a very attractive appearance. Flesh deep yellow, juicy, sweet, with the peculiar flavour of the Miner plum; stone medium in size, semi-cling; skin thick and tough. Quality good. Tree vigorous, spreading, productive. This variety extends the season of the American plums very considerably. It has one drawback in the fact that it cracks easily. It is a hybrid between Prunus americana and P. hortulana, and on this account is hardier than if it were pure hortulana. Where a late plum is desired, this is a good variety to plant.

There are some other varieties which have been highly spoken of, and which, although being tested here, have not yet fruited. Among these may be mentioned Odegard (recommended for its extreme earliness), Legal Tender, Oren, Brittlewood, Terry, Smith and Kieth. The Surprise plum, which is said to be one of the best, if not the best, in quality, may not be hardy enough for the coldest parts of this country as it is of the hortulana group, but it is said to be one of the hardiest of that group.

Varieties of Plums and their Pollinators.

Cheney, Gaylord, New Ulm, Silas Wilson, City, will pollinate one another.

Bixby, Wolf, Stoddard, Hawkeye, Wyant, American Eagle, Hammer, will pollinate one another.

Aitkin has no good pollinator among the other varieties recommended, as it is a very early bloomer. Cheney, which comes nearest being one, is not in full bloom until six days later.

This year, when there was an abundance of European plums on the market, the Americana plums grown at the Experimental Farm sold readily at 50 cents per 12-lb. basket. A tree of Bixby plums planted in 1893 gave a yield of 11½ gallons, which, at 50c. for 10-lb. basket, was $2.87 worth of fruit from that tree, and in a good season the yield would be much more. The following quotation from a recent letter received from Mr. Alex. Stewart, Hull, Que., a prominent fruit grower in this vicinity, is evidence as to the esteem with which these plums are held by other growers. He writes: "I have not fruited a very great number of Americana plums as yet, as my orchard is young, but I am very proud of some of those that I have fruited. Their hardiness, fine appearance, and good quality make them of great value to the fruit grower of Eastern Ontario, and the Ottawa Valley in particular. The best five I have fruited so far are as follows:—Hawkeye, Stoddard, Wolf, De Soto, Wyant.

"I sold my plums in 10-lb. grape baskets at 40c. per basket; 20 lb. baskets of Western plums sold for 65c. per basket at the same time. People will pay a third more for the local fruit. I took eleven 10-lb. baskets of Hawkeye off one tree five years planted. That will pay well. There will be quite a few plums planted about Ottawa next spring. I have given lists of the best varieties to a number of people. In five years from now we will see some good plums about Ottawa, and we may thank the Experimental Farm for their introduction."

Mr. H. C. Carstesen, Billings Bridge, Ont., who makes a specialty of the native plum, Prunus nigra, has also kindly furnished me with some information regarding his success with them. Mr. Carstesen's trees are practically all seedlings of his own raising, some being much better than others. The soil in which they were grown is a heavy clay loam. The trees are kept thoroughly sprayed with Bordeaux mixture to prevent blight. Mr. Carstesen now has between 300 and 400 trees in his orchard, but many of these are young. Some of his trees have yielded from four to five pails each. The following are some figures furnished by Mr. Carstesen of some of his sales:—

1899, 79 pails, averaging 80c. per pail.
1899, 71 " " 93c. per pail.
1900, 177 " " 87c. per pail.
1901, 149 " " 82c. per pail.

Some of the best of the plums sold as high as $1.00 per pail. Mr. Carstesen could not obtain these prices if it were not that his plums are very early, as they begin to ripen the first week of August, and come on the market when there is little competition with other plums. He says that he cannot supply the demand for them.

The following extracts from a letter received from Mr. C. H. Snow, Cumming's Bridge, Ont., show that all growers are not favourably impressed with these plums:—

"I cannot give you any encouragement so far as these American plums are concerned. The older the trees grow, the more rotten and miserable they look, and it would take a man doing nothing else but bolting and propping them up. Wherever there is a crotch limb, down it comes by its own weight only. The recent sleet and rain that formed on the trees about 10 days ago pretty nearly finished the best of mine; in fact, some of the trees of De Soto will break off at the stump like a clay pipe

"Now for the fruit: The astringency in the skin shows up remarkably well when preserved. You should be at the table sometimes and hear the remarks of my children when my wife brings out some Hawkeye plum preserves. There are plenty of our old Canadian plums better for preserve, and if the people would only spray them they would be all right, and so far as selling, they bring a better price per pail, coming in, as they do, the first week in August, before the Prunus domestica class are shipped in here. This lateness in ripening is a great drawback. It brings them in straight competition with Lombard, Damsons, Yellow Eggs, and Gages. Bate & Co. sold mine this year, and the complaint was that the women folks found the skin too thick. The price paid me for a two-gallon basket was 35c., nearly a pail. Some of my neighbours got 75c. and $1.00 for common wild plums. Still, the price is all right, and would pay at this

figure if one could sell a large quantity, but the competition is too keen from a much better source, viz., the European varieties. The varieties so far fruited with me are: Stoddard, Rockford, De Soto, Hawkeye, Wolf, Weaver (2 kinds), Black Hawk; the best of these are Stoddard, Hawkeye, and Wolf."

It is very true, as Mr. Snow writes, that the tree splits easily, and this is a drawback to the Americana varieties which the Nigras do not suffer from, but if the present market for these plums continues, paying crops will be obtained before the trees are too badly split to produce fruit, and as the trees begin to bear when young they may be replaced. The skin of the Nigra, or Canadian wild plum, breaks up easier in canning and preserving than the Americana, but they are not as rich. The Cheney is one of the best of these. Many of the Americana plums are but slightly astringent when preserved. Hawkeye is one of the poorest for this purpose.

The following recipes for canning and preserving Americana plums, published by Prof. E. S. Goff in Bulletin No. 87 of the Wisconsin Agricultural Experiment Station, Madison, Wis., will prove helpful to those who have not found the plums preserve well:—

The native plums, especially those with firm pulp, after being treated by any of the methods mentioned below, are well adapted to all purposes for which the foreign plums are used. As a rule, more sugar is required for the native plums, but the preparations are rich in proportion. The harshness in the skin and stone of some native plums is readily removed by steaming them in an ordinary cooking steamer until the skin cracks; or pour over them boiling water to which has been added common baking soda in the proportion of half a teaspoonful to a quart. The thicker-skinned varieties may be readily peeled by placing them in boiling water two or three minutes. The recipes follow:—

Canning. Pick the fruit when well colored but a little hard, steam or cook in a porcelain-lined kettle until tender, put in cans that have first been treated to boiling water and cover with boiling syrup made of equal parts of granulated sugar and water, filling the can to the top; then run a silver knife around the can inside and let out the air, and seal at once. Plums cooked in the syrup are likely to be tough. Canned plums may be used for pies and for mixing with or flavouring other fruits. Plums are often canned without sugar to be used in winter for making fresh plum butter. The juice of canned plums makes excellent jelly. One lady recommends splitting native plums to the stone on one side before cooking, to avoid crumbling.

Drying. De Soto, Wyant, and doubtless other varieties may be pared, pitted, and spread on plates, lightly sprinkled with sugar and dried, first in the oven and later in the sun. Cook like dried peaches.

Plum Jelly. The fruit should be gathered when only part ripe, about half colored. This point is very essential. Put plums in a large granite or porcelain kettle—the latter is best—with barely enough water to cover them. Cook until tender, but not until they are in a pulpy mass. Having previously covered a large jar with a cloth, strain the fruit in and let the juice drop through, but do not squeeze. When all has drained through, strain once or twice more through another cloth, until the juice is perfectly clear. To one measure of juice provide one measure of granulated sugar, but do not put together at once. A very important point in the making of all jelly is that only a small quantity should be cooked at one time. Into a medium-sized kettle put, say four tumblers of juice; let it boil briskly 15 or 20 minutes, then add the four tumblers of sugar, and in a very short time—usually from 3 to 10 minutes—the jelly will be finished, light, clear and delicious. To test the jelly, dip a spoon into the boiling juice and sugar and hold it up; when the jelly clings to the spoon in thick drops, take it off quickly and put into jelly glasses. The plum pulp which is left can be put through a collander and used for plum butter."

The following is regarded as important by one contributor: The earlier in the morning and the clearer the day the better will be your jelly. A cloudy day makes dark jelly, and if not made early in the day the juice requires boiling so much longer that the jelly is dark, and sometimes it is almost impossible to get it to jelly.

Another correspondent writes: "It is well to begin to test it after boiling 15 minutes, putting a teaspoonful at a time in a saucer and setting in a cool place for a

moment; scrape it to one side with a spoon, and if it is done the surface will be partly solid; then roll the tumblers in boiling water quickly and fill them with the jelly. On the top of each, while it is still hot, drop a lump of clean paraffin, which will melt and cover the top quickly, preventing moulding. If prepared in this way it will not need to be tied with brandied paper or other special care taken."

Plum Butter, Jam, or Marmalade. Boil the fruit in clear water until nearly done. Remove from the stove and put through a colander to remove the pits. Then rub through a sieve to make the pulp fine. Place pulp in a kettle with about half as much sugar as pulp, or, if you wish to have it very rich, nearly as much sugar as pulp, and boil down to the desired thickness. Stir almost constantly to prevent sticking to the kettle.

Plum Preserves. Take equal weights of fruit and sugar; place in stone jar a layer of fruit, then a layer of sugar—alternating thus until quantity desired is reached. Let stand over night; in the morning drain off the syrup that will have formed into a porcelain-lined kettle, place same over the fire and let syrup come to a boil; then pour it over fruit in jar again; repeat this every day until the fourth heating, when fruit and syrup are both put in kettle and boiled for a few minutes. Place same in glass jars while hot, seal and put away in some cool and preferably dark place.

Still another recipe. To each pound of plums add a pound of sugar; put the fruit into boiling water until the skins will slip; peel and sprinkle sugar upon each layer of fruit in a bowl, allowing them to stand over night; then pour off the juice, bring quickly to a boil, skim and add the plums; cook very slowly till tender and clear, which will take about one-half hour; take them out carefully and put into a pan; boil the syrup a few minutes longer until it thickens; pour it over the fruit; seal or tie them up.

A better plum for this part of Canada will probably be obtained by crossing the Nigra with Americana, as it is possible that a variety may be originated which will have the tough tree of the Nigra and the thinner skinned fruit of that species with the productiveness and freedom from disease of the Americana and the quality of that species.

The trees at the Experimental Farm are 10 feet apart in the rows, the rows being 20 feet apart; this greater distance being required in order that the trees may be thoroughly sprayed. Ten feet is a little too close in the rows, as the trees are already interlacing, but this could not very well be avoided, as the original trees were planted 20 by 20 feet apart, and the additional trees set half way between. A satisfactory distance would be about 15 feet apart each way, which would permit of thorough spraying for a long time. The trees, which are rather easily broken and split on account of the heavy crop they bear and the great growth they make when young, are better protected than if they were planted further apart.

Many seedling plums are being grown at the Experimental Farm, and a number of the Americana seedlings have borne already. Of these there were only three which were considered equal or superior to best named varieties under test.

Before sitting down I would call your attention to a bulletin on Apple Culture published this year. I have long felt the necessity of a bulletin on this subject, and after gathering as much information as possible from the best apple growers of the country I prepared this bulletin, which may be had free for the asking. I think it covers the apple culture pretty well. In it are lists of the different varieties which I have recommended for the different sections of the Provinces of Ontario and Quebec. We divided them into thirteen districts, which are marked off with heavy lines. Then I have given a list of apples which I considered most suitable to grow in those districts, with the description of them.

PROFITABLE GRAPES.

By M. Pettit, Winona.

I did not suppose we would reach this subject on the programme, as it was so full, and I told the President that I would give way for Prof. Hutt's subject, it was of so much greater interest to the country at large, as grape-growing is confined only

to some localities. If I give you a list of varieties that are profitable with me they possibly might not be profitable in other localities. I think there is no fruit that varies so much with the soil and the locality as the grape. I have given a fairly good test to over 140 varieties, and I will mention some that have been most profitable with me. In white grapes the Niagara is one of the most profitable, largely on account of its producing such enormous crops. The next white grape in profit to that is Moore's Diamond. It is not so prolific, but being earlier and of good quality commands the highest prices, and that makes it rank about next to the Niagara in profit. In red grapes I would mention the Lindley, Roger No. 9, Agawam, Roger No. 15, and the Catawba—although in many parts of the Province the last named would perhaps not ripen. In black grapes the Worden and Concord and Roger No. 4, Wilder and Barry No. 44.

Mr. W. A. Whitney: Would you mention the Brighton ?

Mr. M. Pettit: No, sir, not for profit. It is inclined to mildew, and it is not a very regular bearer.

SAN JOSE SCALE.

Mr. M. Pettit: In moving the resolution at the meeting on Thursday I should have asked that the old committee be reappointed, or a new committee should be struck; consequently it is moved by myself and seconded by Mr. Beall that the San Jose Scale Committee of last year be reappointed. (Carried.) The following are the names of that Committee:—M. Pettit, G. E. Fisher, E. Morris, W. M. Orr, Robt. Thompson, W. H. Bunting, J. D. Wigle and Major Hiscott.

REPORT OF THE TRANSPORTATION COMMITTEE.

Your Committee beg leave to report as follows:

That while the concessions previously secured by your Committee have been continued and maintained, they regret to state that they have not been able to bring sufficient pressure to bear upon the Canadian Joint Freight Association to secure the adoption of several of the remaining clauses of the schedule as submitted to them on behalf of your Association. These clauses, although considered by your committee to be just and reasonable, have been declined by the R. R. authorities each time they have been presented.

Your Committee recommend for your consideration the following suggestions:

1. That a revised schedule of reductions in rates and improvements in service be laid before the R. R. officials for their consideration, with a strong request for their acceptance, in order that at least to some extent justice may be done to the fruit industry.

2. That, inasmuch as improved systems of refrigeration and ventilation, in connection with the carriage of fruits, have been favourably reported on from the tests already made, and since the car service in this respect has not been satisfactory in the past, the railroads be requested to arrange for a more extensive equipment in this respect, on some plan that may show reasonable prospect of success.

3. That matters of local grievance or hardship in connection with the transportation of fruits be promptly reported to the Secretary of this Association, with full details, in order that complete information on this point may be obtained, and efforts put forth to relieve the same if possible.

4. That some comprehensive plan be adopted whereby the local conditions of oversupply or scarcity of fruit in any particular district may be promptly made known, so that a more even and satisfactory distribution of our more perishable fruits may obtain.

5. Your Committee note with satisfaction that improvements in the service are being made by the Steamship Companies, and while they regret to learn that the financial results from export shipments have not yet been of such a nature as to inspire confidence in the shipper, they trust that the time may not be very far distant when it will be possible to land our apples and pears in the English market in uniformly good order, and with a reasonable assurance of a safe and careful handling throughout the entire journey. To this end it is hoped that the Dominion and Provincial Governments will continue to supplement the valuable assistance already rendered in this respect, which has been productive of good results.

All of which is respectfully submitted.

(Signed) Wm. H. Bunting.
T. H. P. Carpenter.
E. D. Smith.
A. H. Pettit.

Mr. W. H. Bunting: The report as presented to you is the crystallization of the efforts of the committee in two protracted sessions, and the result of some considerable correspondence, and after hearing yesterday the addresses of Mr. Dawson and Prof. Robertson, if time would permit this subject might be enlarged upon, but as the matter was taken up yesterday to some degree, and as your programme is more than full, I think it would not be wise to say anything more in reference to this matter, except that it is the mature judgment of the committee after full consideration. I would move that the report be received and adopted.

The motion was declared carried.

Mr. A. McNeill (Walkerville): It does occur to me that this subject should be discussed in a meeting of this sort. It is perhaps more important than any other subject that has been taken up here to-day, and I for my part, though a member of the committee, can say that I am not at all satisfied with the work of the committee. I say most emphatically that the most important committee that this convention has appointed has not done its whole duty. The reason is perhaps that the Chairman has had more than he could do, and do it well, and the other members were not able to cope with the problem that was before them; and I want to say just this much, that I do not think it would give a proper expression to the opinions of this Fruit Growers' Association if it should go out that we simply received this report—this rather milk and water report—for I helped to make it myself and know what it is. It should not go out to the public that we are satisfied or very nearly satisfied, and in only a weak sort of way would object to what we are suffering from the Transportation Companies. This is a subject that is right at the basis of our business You can plant all the orchards and vineyards and plantations that you please, and you can take care of them as well as you may, but it is the Railway Companies that are going to get the profits. I hope this subject may be discussed at some stage so as not to give the impression that we are satisfied or anything like satisfied with the treatment we are getting at the hands of the railways.

Mr. E. D. Smith: We have accomplished something—as much as I ever expected we would accomplish; we got grapes placed into a lower classification, and got the concession that grapes and other fruits in mixed carloads should each carry their own rate, which was something. It was a sop thrown at us, but it is utterly useless for us to go before them unless we are able to say that there is some great injustice done. Until we are prepared to do that we are only wasting time, and since we have been before them twice I think it would be well to have a new band of men.

Mr. G. C. Caston: I think we should move in favor of a Railway Commission, and I would move an amendment that in the opinion of this Association the time has now arrived when a Railway Commission should be appointed with power to regulate the grievances with respect to freights in Canada.

Mr. D. J. McKinnon: I have a resolution exactly on these lines, seconded by Mr. Race of Mitchell.

"That various committees and deputations, from this Association and from other bodies of fruit growers have from time to time laid before the railway authorities the injustice of the freight rates and regulations affecting the transportation of fruit; that the railway authorities have invariably refused to grant any but the most meagre concessions; that your committee see no reason to hope that any rate less than "what the traffic company can bear' will be voluntarily conceded by the railways; that the Dominion Parliament is the only authority in the country with the power necessary to compel transportation companies to do justice to the public; that your committee therefore recommend that the Government of Canada be memorialized to appoint a Railway Commission without delay to fix reasonable rates for the carriage of goods by freight and express, and to provide for the enforcement of all rates fixed and regulations made by such commission by the most summary and simple process possible, with heavy penalties for all infringements of such rates and regulatons."

Mr. McKinnon's resolution was put and carried.

Mr. Bunting moved, seconded by Mr. McNeill, that the transportation committee be as follows: H. D. Dawson, Toronto; J. G. Graham, Belleville; E. D. Smith, Winona.

OUR BEST COMMERCIAL APPLES.

By Walter Dempsey, Trenton.

When I came here I had quite a few thoughts about what I should say, but listening to these men that have gone before me I find that they have tripped me up in many lines, and they have taken away what I had thought out. Mr. Caston told you that the northern district was the best in the Dominion for apples. Others claimed other sections as the best. We in the Bay of Quinte District claim it as one of the best apple sections of the Dominion. (Applause.) I believe there is proof for it in the gold and other medals that you see going to that district from the Pan-American this year. There have been a great many apple trees set in the last few years in our section. The varieties that have been most largely set are the Ontario, the Spy, Hubbardston's Nonsuch, Strawberry Pippin, Gano, Stark, Ben Davis, and in Prince Edward County the Arctic has been largely set. As to the apples that I have found in my own ground that have been paying for years right along—I begin to ship apples the last week in July and continue that season till along in April—I have found to suit me best the Duchess, commencing the last week in July, and then following on in rotation Trenton, Wealthy, Fameuse, Hubbardston's Nonsuch, Westfield, Seek-no-further, Ontario, Spy, Stark, Ben Davis. I have found these varieties very profitable in my own orchard. Then as to the varieties that have been under test, two which are looking most promising just at present in my idea, for shipping, in winter especially, are Aiken's Red, a medium-sized red apple, and York Imperial, which is a very bright, beautiful apple, a little different in shape from the one that we had upstairs.

Mr. J. Tweddle: Does it mature in color and perfect in every way.

Mr. W. H. Dempsey: It did with me. I was well satisfied with it. Then comes Sutton's Beauty, Missouri Pippin, Rome Beauty, Mammoth Black Twig. I think that these may possibly yet come to the front as commercial apples. In looking around through our towns and villages I find a number of amateurs who are endeavoring to grow apples in a small yard. I do not think we need stand by and let them run away with the idea that they should plant just Ben Davis and Gano and some of those varieties. I would recommend for their benefit the Primate. It is quite an old apple, begins to ripen with me in July, and continues on through September ripening slowly along, and the fruit is very delicious in flavor. It carries its rich flavor into sauce and into pies. It very much resembles the Boiken. The Star comes into season about the same time as the Primate, is very

near the same in flavor, but it does not last as long. Then McLean Garden Gem; then the Winter Banana and Boiken, which resemble each other very closely, but as a rule in the Bay of Quinte we do not get quite as much color as Mr. Caston does on those varieties.

Mr. Caston: In that list for amateurs with small gardens they are principally all dessert apples of high quality.

Mr. Dempsey. They are high quality for the amateur garden. The last two may come into commerce, but the others are too tender for shipping I would think.

A Delegate: What about Yellow Transparent?

Mr. Dempsey: I would take the Primate for my own use before the Yellow Transparent. They are about of the same season.

Mr Caston: It is good for about three or four days.

Mr. Elmer Lick: Is the Primate tree hardy with you?

Mr. Dempsey: Yes, it has proved perfectly hardy with me, and a heavy cropper.

Mr. Caston: It is only about half hardy with us.

HOW TO PRODUCE FINE APPLES.

By Harold Jones, Maitland.

Most of the audience here seem particularly anxious to grow fine apples. I think it is hardly fair to throw such a responsibility on me, who has had so little experience in that matter. And then when I think over all that has been discussed here—the questions of pruning and spraying and the selection of varieties and cultivation—and all those things that have been taken up so ably by our men, what is there left for me to talk about? I think the keynote to the whole question is one that is little thought about by a great many growers, and that has had very little consideration, and that is the adaptability of the varieties to the different sections of our country. Among us to-day there is a general lack of knowledge as to the capabilities and resources of the localities of our Province alone, not to speak of the whole Dominion. In the past there was a very sad lack of knowledge of the resources of our country, as shown when Judge Ford of Ogdensburg a few years ago, in sentencing a person, banished him "from off the face of God's earth into Canada." At that time we had not such men as Prof. Van Deman and Prof. Waugh paying us friendly visits from time to time. I am afraid they had rather a vague idea of where Canada even was. Coming down to more recent date, what do we find among ourselves? Six or seven years ago at the annual meeting of this Association at Woodstock a man asked me if we could grow anything away down east on the St. Lawrence except Crab apples? He little knew that away down there is where we grew the finest Fameuse apples in the country if not in the whole world. (Hear, hear.) Where else in the world has any apple received such attention or received such a name as the Gravenstein of Nova Scotia in the Annapolis Valley? Then again when you come to other points in the world other apples are grown to special excellence—down in the Hudson Valley the Green Pippin, in Virginia the Albemarle Pippin, in southern Illinois and Missouri those tremendously large bright Ben Davis, such as surprised us at the Pan-American Exposition. Coming nearer home, where do the buyers of the world come to look for their Spys and Baldwins if not to the northwest portion of the State of New York and to central and western Ontario? Then, when you want to get those large, beautiful, high-colored, fine-textured Snow Apples or Fameuse, or apples of that group, you have to go down the Valley of the St. Lawrence and possibly on the Islands of Lake Champlain, and that is where these apples grow to perfection. I am using those varieties only as an illustration. Of course in many sections there are special varieties which grow to special excellence, and we need a more general knowledge as to how far and to how large an extent these apples will succeed. They are particularly valuable to local sections, and in the future we may find them equally valuable for large

sections, but that remains to a large extent for our experimental stations in the Province, and stations and fruit gardens carried on under similar control in all other countries to decide upon those questions. In the meantime it is decidedly to our advantage to grow the apples that we know succeed in our section; grow the apples that we know that the buyers want; grow them in large quantities in one section, so that it will attract the buyers from all over the world, so that they will come to us from the old country, from those countries in Europe where there are so many apples wanted, so that they will come to us up the St. Lawrence and say, "Here is where we get the Fameuse and the Scarlet Pippin and the McIntosh Red, and we want them from you and we will pay you good money for them if you will just grow them right and spray them right, because you have got the soil and the climate to grow them to perfection.' They are going to Vermont and to central Ontario for their Spys, and down the Hudson River for their Greenings and their Newtown Pippins, and back into Nova Scotia again for their Gravensteins, which they can get there in plenty and of uniform quality, and that is what they want. The buyers have told us time and time again, "Send us one good variety in good quantity, and then we can command the price for it." If you want to grow fine apples do not set out every variety of apple that is recommended to you by the nurseryman or his agents. The travelling agents will almost in every case try to sell to you the varieties of which the nurserymen have the largest supply, and those varieties are generally the ones that are the easiest grown in the nursery row, and that one thing often leads to the planting of varieties in sections of the country where they are not at all adapted, and they will never be able to grow apples that will receive any attention from the buyers whatever. Now to illustrate: If we down on the St. Lawrence should undertake to grow the Spy and Baldwin, and our fruit growers in the Grimsby district should undertake to grow Snow apples, and we stuck to these varieties and kept at it, in a very few years I think we would both come to the same opinion, that apple growing is a very unprofitable business, and that it was almost impossible to grow an apple anywhere in this country that was fit to eat. Now we can remedy that matter by just changing over varieties and taking our own. (Applause.)

Mr. Graham: People who have been endeavoring to ship apples have found serious difficulty with so many varieties. You can scarcely go into an orchard of any size but what you have twenty varieties. If we buy a few thousand barrels in any section of Ontario we probably have forty varieties in that district. It materially injures the commercial value of the fruit to have so many varieties. If we grow to ship to another market we can get very much better returns with two or three varieties in a car than we can with forty, even if they are all of equal merit. Rather than grow so many varieties if we would confine ourself for commercial purposes to at least ten we could grow all the apples that the foreign markets demanded and get much better results from it.

Mr. Maher: I am only a local man. As I understand, one of the objects of this convention is to overcome so many different grades and qualities of apples. We are here to get information, to know from this onward just the best kind of trees to plant. In years gone by our forefathers did not know the best kind of apple to grow, so no blame should be attached to them. Mr. Jones gave us some very valuable information, but I would like him to go a little further and tell us what soil these trees that he has spoken of do the best on. Through this locality I know the soil differs every two or three miles. In the eastern part here we have heavy clay, from here west we have very light land, so that while the climatic changes are not different the soil differs very much.

QUESTION DRAWER.

Q. "What is the cause of the failure of the apple crop this season?"

Prof. Van Deman: Well, there were various causes that led up to the failure, and in a large measure the apple crop failed because of the unfavorable climatic conditions in the springtime. That was the general cause of the apple failure of North

America this year. There are some parts of the country where this condition did not prevail, especially in Washington and Oregon, where we have had a very abundant crop, and in a few places in the lower Appalachian Range in Virginia and North Carolina, where they had a very fine crop. In Kansas and Missouri they had a pretty good start. The apple crop set out well, and then they had a very severe drouth that covered all that prairie region and nearly destroyed the apple crop, but finally the fall or late summer rains came on, and they had a fair crop.

Q. "What variety of apple has done best the past season ?"

A. Well, I do not know. I expect if I were to say it I would say Ben Davis. (Hear, hear.) Ben Davis is about the hardiest variety, all things considered, that we have, take the country all over; and I must say I am very sorry to see the Ben Davis doing so well up this way. (Laughter.) It is a good deal like what my friend Baush of Oregon says: "No matter where you find it, it always has that delightful sawdust flavor. (Laughter.) It certainly does lower the standard of the apple the world over to have this miserable Ben Davis constantly up before the people of the country to buy, and while I do not think the fruit growers at home consume very much of it, I know I never eat a Ben Davis unless I am dreadfully pushed—(laughter)—still it is the business apple of the market to-day. There is no denying that fact, and it is pushing its way in spite of all sorts of argument. It does not need any argument. It argues for itself. I have argued against it, and—I do not know why—I plant it—(laughter)—and I suppose I am inconsistent like a good many of the rest of us. We don't like it, and yet we plant it. Why do we plant it ? Because of the dollars that are in it, and that is why. That is the commercial view of the situation, and I am sorry to see it doing so well in Ontario. I solemnly protest against its planting, and yet it is here, and I do not know but it is here to stay—I am afraid it is. (Laughter.) It seems to be taking root as far north as Nova Scotia, and here is our good friend from Prince Edward Island who thinks that it is one of the luxuries up there. Oh, that makes me feel bad. (Laughter.) Now in Missouri and Kansas it is an eminent success, and the Ben Davis that grows there is quite a different apple from what grows here. It has a better quality, it has a better chance of developing, and it is handsomer in color, but here is one, for instance, that is picked very early, and a Ben Davis from Missouri that is not near up to the standard, that is more like the Ben Davis that grows here; in fact, you do a good deal better than that, and so does New York. (Yes, and hear, hear.) If I were planting here I do not think I would plant Ben Davis (Laughter.) No, I think I would plant the varieties that you have been making money of. Perhaps not a Baldwin; I think that Baldwin is not really any better than the Ben Davis, take it up one side and down the other, when it comes down to quality. I know there is a good deal more quality here in the Baldwin than in the Ben Davis, but I am talking now about the Ben Davis in the Ben Davis country, comparing it with the Baldwin in the Baldwin country. I think they are just about six and half a dozen in quality, and the Ben Davis is finer in color and appearance. Appearance is a good deal, and I should advise you to stick pretty close to the old-timers here rather than to venture far on in these new things, even Ben Davis. But let me say I would not discourage experiments. Experiments are just the things that teach us the best things to do, and I should try these varieties that are named, everyone of them, except—well, you might try that in a very small way—and that is the Mammoth Black or Arkansaw—and I should exclude the entire Wine Sap family from this part of the country at all. I do not think the Wine Sap or any of its kin belongs here whatever. York Imperial has been mentioned: I would advise you to try that. I saw it this year to my astonishment, a pretty fair looking apple in Nova Scotia, and I am quite confident that it will do well in a considerable part of New York State, especially the Hudson Valley, and in western New York and in part of Ontario.

Mr. E. Morris: It does well in the Niagara district.

Prof. Van Deman: I think that is one you can plant commercially, but I should not advise you to do more than plant it experimentally, and then you could tell what to do with it.

Mr. Caston : Where did that apple originate ?

Prof. Van Deman : In Pennsylvania. It does not matter where an apple originates; where an apple happens to start from, is of no more consequence than where a person happens to start from. It depends on the person as to what there is in the thing.

Colonel Roger : Do you know the origin of the Ben Davis ?

Prof. Van Deman : Well, that is a little bit mystified. The Ben Davis is supposed, by those who have dug the deepest into history, to have originated in Tennessee. Some think it originated in Virginia and was carried into Kentucky. It came through Kentucky into Illinois, and that region. Tennessee is likely the original home of it. Now the Rome Beauty is another one that I should advise you to try. I am very much pleased with the behavior of the Rome Beauty in this country. Of course, it is a little tender in tree, and where your winters are very severe you will not find it acceptable. In southern Ontario certainly I believe that the Rome Beauty is going to be all right. Gano has been mentioned, which is nothing but a redder Ben Davis—just a Ben Davis with more solid color and less stripes; more red is all you can say for Gano. I know the place of origin of it. It is perhaps a bud from a tree in the State of Missouri, and to all intents and purposes it is a Ben Davis, and it will do just as well as Ben Davis and no better.

Mr. Morris : What about the Sutton Beauty ?

Prof. Van Deman : Yes, the Sutton Beauty is certainly coming to the front. It is a better—that is more constant—bearer than the Baldwin, and better quality and good color and about the same in size, and I think Sutton is one of the coming apples for this part of the country. It is a red winter apple of good quality that we are after. (Hear, hear.) Now, I would like to talk Jonathan to you, but I am afraid Jonathan is a little too small. (Yes.) Of course, in the southern part of Ontario it may be all right, but it is rather small. When you come to a fancy market apple, and a first class A1 home apple, give me the Grimes. That is one of the apples that you ought to top-work, at least two or three of your trees on every one of your farms, and have something to eat at home that is good.

A Delegate : It turns brown.

Prof. Van Deman : I am talking about it every time. It will scald a little in storage, but not very seriously. Do you find it so ?

A Delegate : I am repacking this week and they are quite brown now.

Colonel Roger : You do not mean the Grimes Golden Pippin ?

Prof. Van Deman : Yes.

Colonel Roger : I would not give you ten cents for a shipload of them.

Prof. Van Deman : I am talking of fancy market.

A Delegate : I would like you to find a fancy market for mine.

Prof .Van Deman : I would certainly plant some Grimes here until I was sure they were wrong.

Mr. A. McNeill : They grow well here. The trouble is the market will not endure them in barrels.

Mr. G. C. Caston : In our section of the country they are absolutely tender.

Colonel Roger : They are of no use for this section.

Prof. Van Deman : With me it has not been any more tender than the Ben Davis.

Mr. Jack : I find it hardier than the Ben Davis in the city of Montreal.

Mr. A. E. Sherrington : With me it is perfectly hardy and an annual bearer, and for home use I do not think you can get anything better.

Prof. Van Deman : Now you see we have got a variety of conditions.

Mr. Sherrington : Can you tell me anything of an apple grown in your country called the Red Williams ? It is always quoted at the top of the market.

Prof. Van Deman : It is a very good early, not the first early, but the second early summer apple, of very good quality and beautiful appearance, fair size, one of the handsomest market apples you could find at all. I should think that ought to be well known here. It is an old variety, I guess 100 years.

A Delegate: Why do not you say Northern Spy and be done with it?

Prof. Van Deman: For a winter apple? Oh, yes; the Northern Spy is a splendid winter apple. I said a while ago I would stick to the old-timers very largely. I think I should plant Northern Spy if I were here.

Mr. McNeill: Would you if you were not to remain half a century?

Prof. Van Deman: Yes, the younger I was the more I'd plant. (Laughter.) I want to mention the Missouri Pippin. You know we are cutting off these superfluous names. A pippin doesn't mean anything at all but a seedling from the pips, and just as well drop that out; the whole "seedling" and "pearmain" and "pippin" business we are going to relegate to the back ages. That Missouri is a red winter apple of fair quality, fair size and extremely early in bearing, as much so as Yellow Transparent, and as a filler, it is in my opinion one of the coming apples for your region. It will not grow big enough, I am afraid; it will be hardy enough—it is as hardy as Ben Davis and goes right along with Ben Davis in the central States. Mr. Wellhouse, of Kansas, made more money out of the Missouri than he did out of all the other varieties up to the first fifteen years. You say, "Well, fifteen years, we have only got started then." Well, but he had his orchard paid for, and the Missouri that he had planted paid for the whole thing by the time the Ben Davis was well into business; the Missouri was practically done, but it served its time, and I should plant it instead of planting peach trees. I would never plant a peach tree in an apple orchard. (Applause.) I have tried it and have seen it tried thousands of times, and with very few exceptions I would condemn it from experience.

Mr. Boulter: Would you put plums in?

Prof. Van Deman: I would put apples in an apple orchard and peaches in a peach orchard, and plums in a plum orchard. There are several reasons for that, and one is that the treatment that an apple orchard needs is not always the treatment that a peach orchard needs, that is as far as tillage is concerned. Perhaps you want to seed down an apple orchard to clover or something of that kind. Now a peach orchard ought to be cultivated for ever and for ever as long as it stands. I would never seed a peach orchard down to anything; and then when it comes to spring, you know, the wind blows when it wants to and not when we want it to, and sometimes it blows the spray from the apple trees over on to the peach trees and injures them. The greediness of the peach tree is another very serious objection to its being planted in an apple orchard.

Mr. Demill: Would you recommend clover in an apple orchard?

Prof. Van Deman: Yes, I think that is a very good thing. I think clear tillage is the best thing all round, but occasionally I would seed it down to clover. I was going to say another thing about this matter of fillers, that if you will put your permanent apple trees forty feet apart, and then fill up with these early bearing kinds, you can put in Wealthy, Yellow Transparent or Missouri or Wagner and fill up between the rows, and then put in an extra row every fifth row. That is, every third row of fillers leave out, having two rows of fillers and then skip, but put in right through the other rows for every tree a filler, and those fillers will have paid for the orchard, so that it won't have cost you one cent an acre by the time the permanent trees need all the ground, and then you can cut them out. Any person who has not got grit enough to cut a tree out when it needs to be cut ought not to be in the business. It is ust the same as it is with a pig; when a pig gets to killing time, kill it, that is what we raise it for; and whenever the permanent trees need the room, give it to them, and that is my doctrine. Put your trees forty feet apart. If I were further west I would talk about closer distances, but here forty feet is not too far. That brings up this matter of pruning. That talk of Mr. Hutt's this morning was excellent, first class; I say "amen" to every word he said. He told you gospel truth on orchard pruning this morning, and I should give those trees abundant room. It is fruit that we are after, we are not in the forestry business, nor in the seed business. Let us grow trees for the fruit, and the better that fruit is the better prices we can get. It is fruit we want, whether we eat it or sell it, and the better it is the better for us. That brings up the subject of these old orchards you have that

have got their limbs intertwined and that are crowding each other, and there is a good deal bigger feeding going on under the ground that there is in the air. (Hear, hear.) Because those roots are longer than we think, and they are hungry for moisture and for fertility, and you have got to give the tree under ground plenty of room or else it cannot do much above ground; that is just as certain as anything can be, and if you don't feed that tree in the ground, I assure you it will not get food out of thin air. It will get the wood part out of the air and every atom of that, except what is left in the ashes after you burn it; it will get the carbon out of the air, but it will not get the fertility out of the air to make that grow; and whatever you do you have got to give that tree room. I should just take one of those old orchards, having some of those little scrubby apples on, and I would make firewood out of about three-quarters of the trees, and take care of the rest of them. I have been in a great many orchards where this very heroic treatment has been tried with eminent success. I could refer you to many apple growers in the State of New York who have had a lot of these old orchards treated in this way and they found it paid. I was at Mr. Beck's place, in Batavia, where he had old trees that would bear twenty-eight bushels to the tree, sound to the centre, as solid as any tree you ever saw, but they had been crowding their neighbors too much and he wanted to get a better grade of apples, and wanted to get the sun on all sides so that the leaves would develop. You cannot have good fruit unless you get good foliage. Good foliage is one of the cardinal principles of good orchard treatment. It is a flag that Nature hangs out as a sure indication of what that tree is doing. That good, healthy, dark apple leaf tells you that the tree is in good condition. Whenever it is weak and sickly looking you know that there is trouble on hand, and the sooner you give that leaf a chance to expand the better it will be for you, and I should not wait at all about taking the case of some of those apple orchards you have got, this very next winter. There is no use in trying to prune off the lower branches and help the tree that way. That just simply elevates the trouble, puts it up a little higher in the air.

Mr. Demill : What do you recommend as a fertilizer ?

Prof. Van Deman : That is a big subject. Now you have a fertile soil, in fact Nature has put into the soil here two elements in great abundance—phosphoric acid and potash. The nitrogen is wanting, but we have in the air above us an abundant store of nitrogen. In the air above an acre of ground we have $4,000 worth of nitrogen. The air is full of it, and if you will only set those nitrogen traps to work—beans and peas and those pod-bearing plants—they will take it out of the air, you are getting that much nitrogen out of the air and putting it into the ground. And the same is true of the Canada Pea or the Cow Pea.

Colonel Roger : What do you mean when you say $4,000 worth of nitrogen per acre ?

Prof. Van Deman : Per acre of air. Yes, four-fifths of the bulk of the air is free nitrogen.

Colonel Roger : How high did you figure ?

Prof. Van Deman : You would have to go up there and see. (Laughter.) I want to say about nitrogen, that if you manure with any kind of commercial nitrogenous manure you get nitrate of soda, that is about the best kind there is, and then mix it with something else, and put it in in the summer time, in the growing season. Nitrate of soda is about the cheapest commercial fertilizer you can buy, slaughter-house refuse, and so on. Stable manure is all right, but I am talking about good commercial manure.

A Delegate : What about ashes ?

Prof. Van Deman : Good ashes that have not been leached are first rate, excellent and in splendid form, but it is not nitrogen.

A Delegate : Do you know the Black Ben Davis that is now being boomed ?

Prof. Van Deman : A Black Ben Davis is just simply Gano. At least if Black Ben Davis has a separate origin they are so near alike that they cannot be told apart in fruit or tree or foliage; they grow just alike and behave just alike.

A Delegate : What about the Stark ?

Prof. Van Deman : The Stark is too green, not high colored enough. It is a good apple otherwise.

Mr. Morris : Set us right about the Canada Red Apple.

Prof. Van Deman : Have you the Canada Red ; this (sample) is not a Canada Red at all. The Canada Red, the one that was first named Canada Red, is an apple of very high quality, delicious, tender, fleshy, and not very big. It is not a successful orchard tree.

Mr. Rickard : In regard to the Spy, do you think that could be grown clean and the spot prevented by spraying ?

Prof. Van Deman : Oh, yes. Spraying will knock out the scab even on Fameuse, but I should grow McIntosh instead of Fameuse.

The President : I want to introduce Mr. Blair, Experimentalist at the Nappan Station, Nova Scotia, who has been atteding our meeting, but whom we have not been able to hear before.

Mr. Blair : I assure you that I did not come here for the purpose of instructing you, but rather to learn that I might assist our fruit growers in the Maritime Provinces. I have not come here feeling that we were ahead of you in any respect, but rather that I could learn; and I have learned. I think that your meetings have been very instructive. We have been enabled to glean much information on various lines, and we will take that home and try to use it. We have a Fruit Growers' Association in Nova Scotia that is working along some of the lines that you are, and in our discussions we have the same subjects brought up, and they are treated in a somewhat similar way. I thank you for your kindness, and I shall go away feeling much benefited by my trip to this part of the country. (Applause.)

COLD STORAGE AT THE PAN-AMERICAN.

By Robert Thompson, St. Catharines.

We have had a good deal about cold storage and the keeping of fruits at this meeting, but we have not had half enough. I would suggest that in future the meeting be divided into two parts, for the discussion of various subjects. In the past the Association has been educative along the line of growing fruit; but the marketing or selling is half the battle. It was thought that we could not keep up the supply of fruit at the Pan-American during the early summer months until our present years' fruit came in. We were afraid it would not keep after it left the storage. To our surprise, this is not the case. We found that fruit would keep as long after coming out of storage as it would after being picked off the tree and placed on the table. (Hear, hear.) I am speaking of fairly good keeping apples ; there were some exceptions in fall varieties. It struck us forcibly there that storage is only in its infancy ; and the discussions here the last few days have borne this out. We have much to learn. Since being at Buffalo this summer I have more faith in fruit growing than I ever had before. I feel there is no danger of glutting the fruit market—that we can put it in cold storage and keep it the way it has been kept this summer, and we will have fruit the year round. At the Chicago Exposition the New York State Association expressed their surprise at apples keeping well, and attributed it to wrapping. In our case we did not wrap the apples, and we found they kept equally well ; indeed, from our experience and observation of what some States did they did not keep as well when they were wrapped as when they were not. But apples had to be taken out of storage carefully ; they could not be taken out and carried to a grocery store in a wagon, or we could not put them in baskets down at the storage and cart them up to the Exhibition grounds without suffering great deterioration. We brought them out of the storage building just as they were packed there, and allowed them to dry off before they were taken out of the cases. In one or two instances we took them out before they were dried off, but we took them out very carefully, so that they were not rubbed or chafed in

any way, and allowed to absorb that moisture, and then they would keep for weeks and months. There is an apple upstairs that was taken out of storage on the 14th May. I have at home two that I preserved as relics, and they are in pretty good shape yet. Another point is that some varieties will keep better than others. You would naturally suppose that apples like Ben Davis and Mann would keep longer than Holland Pippins, Blenheim Orange, and some of those fall varieties ; but we found during May, June and July that those fall varieties were keeping equally as well as the Mann and Ben Davis, and kept better than the Baldwin, Spy and Greening. The lesson I learned about that is this : In the fall we have an over-abundance of fall apples that are hardly saleable, and in a good many seasons our apples will be short. In future, instead of letting our fall apples go to waste, place them in cold storage, and by Christmas and afterwards you will be able to sell them for good money. As to tight and open cases, we might point to success in both cases in our experience at Buffalo. The apples were wrapped in two thicknesses of paper, one of wax paper next the apple and the other of tea paper outside. Some of those apples were almost air-tight, because the wax paper was twisted. We could not see much difference between the apples packed in that way and those that were put in fairly open cases ; but we did notice that apples that were packed in egg cases, without anything around them in the way of excelsior—just wrapped in paper —came out without any scald, notably the Greenings. We had one case left by mistake until some time in August, and the others that had been opened that were packed in cases in excelsior had been spotting very badly before that. When this case was opened, to our astonishment it was the only case that was packed in the card-board cases ; it opened 98 per cent. good. You could not ask for anything better than that ; there was not a single apple spoiled in that case. Another point that struck us was this : that we could not exercise too much care in placing our apples in storage. We did not know where these apples came from last fall, or the history of them, but we could see that in almost every instance apples that were spoiled had received injury before going into the case. This was not the packers' fault, because the apples had been shipped to them in barrels, and you could see the mark of one on the other, and in those cases the apples would not be good. In other cases they would turn out 100 per cent. good. Three cases were opened that had remained in storage the whole season. Two of Ben Davis opened up 54 apples, only 5 bad ; the other one 52 apples, 5 bad, two of these only partially decayed. The Mann apple opened up 100 per cent. good. (Applause.)

Rev. Father Burke : I have simply two or three words to say, and they are words of thanks for the kindly reception you have given me since I came here. I am sure I will take back to Prince Edward Island many lessons I have learned here. I came 1,500 miles, but I have had 1,500 pleasures since I arrived. I do not say I will be able to impart those 1,500 pleasures to the people I represent, but if you ever reciprocate and come down to us, while we are a small population and a small island, our reception will be intensified so as to make you appreciate your visit. The work of these conventions has become so overcrowded that I think it would be very necessary, in order that the whole country get the benefit of the accrued wisdom of the associations of Canada, that we should have some kind of a federation of these councils, and have the different members of them interchange their ideas at some central place. I suggested to Prof Robertson that if we had a federation, with representatives from all the fruit growers' associations over Canada, with the Government footing the expenses, that we would have a large meeting, and have a very good time and do a great deal for the people of Canada. I am sure I shall have the pleasantest possible recollections of this pleasant visit I have had to Ontario. (Applause.)

RESOLUTIONS.

Mr. T. H. Race, in bringing in the report of the Committee on Resolutions, said : Before I say anything in regard to the resolutions of this Association, I would like to submit a matter that has been considered by the members. You are all aware that,

owing to the state of the finances with the Pan-American Exposition mangement, the medals that have been won by our Canadian fruit growers will not be forthcoming. So we thought it would be well to give an expression by this Association, asking the Ontario Government if they, in their generosity, could see their way clear in the way of giving some expression of their appreciation of the efforts of all those fruit growers who have exerted themselves to that extent as to win those awards at Buffalo—that they supply these medals. Now we can scarcely ask the Government to supply all those medals, because there were ten gold medals taken, and a gold medal will cost on an average $170, and $1,700 would be rather a large figure ; and besides the gold medals there were thirty silver medals taken. We thought the Government would not have any hesitation in supplying these thirty silver medals at about $5 each, which would come to about $150 ; and there were forty bronze medals, which would cost about $1.50 each, amounting to only $60; so we would suggest that the Government be asked to supply the silver and bronze medals and do as they please by way of some expression in connection with the gold medals. I will make that motion.

Mr. James Speirs : It struck me that the Ontario Government could not do a more generous thing and a more international love affair than to supply those medals; and from the way the two nations are interlocked at present I think the Government could not do a grander and a more helpful act than to fulfil all the obligations in the medal line that the Pan-American has failed to do. I have read the papers very carefully, and have found that our American cousins have used the Canadian with the utmost generosity in their power, and it would only be reciprocating kindness to award these medals to the Canadian exhibitors. I second the motion.

Mr. Morris : Those exhibitors who took the trouble to send fruit there brought a good deal of honor and credit to this country—(hear, hear)—and not only that, but they went to considerable inconvenience themselves, and I think it is only a small matter for the Ontario Government to give them the medals. I was not able to send any fruit, but did what I could in sending Mr. Bunting roses and flowers from time to time to help to decorate the tables.

Mr. Bunting : I may say in explanation, that I presume, owing to an effort made to be economical in connection with the expenditure over there, the Hon. Mr. Dryden kindly consented to allow me to have the banners prepared which have been distributd here to-day, with the twofold object of recognizing the efforts of exhibitors, and also to bring to this meeting as many gentlemen as possible who had gained awards at Buffalo. I regret that the Hon. Mr. Dryden was unable to be present to assist in the distribution of these banners, as he had intended. It is regrettable that the exhibition people found themselves in such financial distress at the close of the Exposition that they have stated their inability to furnish the bronze medals as originally intended ; and it is now expected that only the diplomas will be issued showing the nature and the grade of the award.

The President : I think if the Government would furnish the bronze medals to all who took bronze medals, silver to all who took silver, and silver plated with gold to all who took gold medals, it would be a handsome thing to do.

Mr. Race's motion was put and carried.

REPORT OF COMMITTEE ON THE FRUIT DISPLAY.

Central Experimental Farm : Collection of 15 varieties of apples, of which Milwaukee and La Victoire are promising for the more northern sections on account of their hardiness and good keeping qualities.

J. I. Graham, Vandeleur : Samples of 10 varieties of standard apples, fine, large, well-colored specimens, grown under the irrigation system as adopted by Mr. Graham.

A. E. Sherrington, Walkerton : 18 varieties of Standard apples, correctly named, large, clean specimens.

W. J. Westington, Plainville : Collection of Northern Spys, fine, well-colored specimens.

Murray Pettit, Winona : Collection of 4 varieties of pears and 4 varieties of grapes, in the new Wilson export package, consisting of a case holding 3 trays, containing 4 baskets of grapes, each weighing about 4 pounds. The pears in a sectional compartment adapted to the size of the fruit ; promising.

C. L. Stephens, Orillia : Collection of apples, containing 25 plates, excellent samples.

R. A. Lehman, Orillia : Samples of 2 varieties of Standard apples

Pan-American Collection : Samples of 52 varieties of standard and newer varieties of apples returned from Buffalo in fairly good condition, also including samples of sweet potatoes and lemons grown in the open air in the Niagara District. Also several good specimens of the Albemarle Pippin and York Imperial apples, as grown in Virginia.

Five cases of 1900 apples, packed by Mr. L. Woolverton for exhibit at Buffalo, opened here after 14 months storage ; 2 cases of Ben Davis, showing 90 per cent. sound and in good condition ; one case of Mann apples, 100 per cent. sound and in good condition, somewhat off flavour ; two cases showing method of packing, apples being wrapped in waxed paper covered with another layer of manilla tissue paper, and carefully packed in case with excelsior between and at top and bottom of case.

Harry Dempsey, Rednerville : Samples of 3 varieties of standard apples, good specimens.

Thomas Spear, Cobourg : Samples of apples and pears for identification.

Richard Cullis, Camborne : Samples of 12 varieties of standard apples.

W. M. Robson, Lindsay : Samples of 6 varieties of apples.

W. H. Dempsey, Trenton : Collection of 24 varieties of apples of the newer sorts and Californian seedlings and one patch of Keiffer pears.

R. L. Huggard, Whitby : Collection of 10 varieties of apples and 13 of pears.

J. W. Bigelow, Wolfville, N.S. : Collection of 9 varieties of standard Nova Scotia apples, sent from the exhibit at Buffalo, large, well-preserved specimens.

W. C. Reid, Belleville : Five varieties apples.

W. H. Bunting,
W. T. Macoun,
F. A. Waugh.

ST. LOUIS EXPOSITION, 1903.

The Secretary : A paper was left with me by Mr. Harold Jones, who has had to leave, on "Organized Effort in the Fruit Exhibit for the Louisiana Exposition in St. Louis, 1903." I think a resolution ought to be passed by this Association, so that if anything is to be done in St. Louis in 1903 we may get to work in good time, so that we may do quite as creditably, if not more so, at this exposition than we have done in Buffalo.

Mr. Race : You will remember that when the Pan-American question first came up there was some objection raised to making any display there, some being quite opposed owing to the trade conditions existing between the two countries, but that had a very small limit indeed, and many of those thinking otherwise moved that a very extensive and a hearty organized effort be made for the display, and you see the results what an honor it has been to this great Province of ours ; and since I am Chairman of the Resolution Committee I would move that this Association give its expression in favor of a very active organized effort being made by the Province of Ontario to make a large and attractive exhibit of fruit, and everything in the line of fruit, at the coming Exposition at St. Louis, so that we might win still greater honor there than we have won at the city of Buffalo.

Mr. Stephens (Orillia) : It affords me great pleasure to second the motion, and I am sure if we make such an effort as we can make, we will not only beat all the other States, but New York State also.

The resolution was put and carried.

PRUNING.

Mr. A. McNeill : As the person who interrupted Mr. Hutt, I have this to say, that I have never heard a lecture of a better type before our Association since it began, that is, of the educative type, and I can assure you it was not for want of appreciation of it that I interrupted at that moment. I hope that kind of thing will go into every school in this country. Let us have more of it.

Mr. W. N. Hutt : I feel like apologizing to this audience for appearing before you again. It seems to me somewhat like an imposition, but if you have any questions on this subject I will be glad to answer them as far as I am able. Of course it is a big subject, and one can only give his experience about it as far as he sees and learns. I think there has been a wrong impression, confusing me with my brother. I am not a professor at all, but a fruit grower from the Niagara district. I was speaking, when I left off, about the length of limbs cut off in what I call a proper manner. When cut off too long it results in a badly healing wound. Where there is a bud you get suckers or water sprouts. A water sprout or a sucker will start where there is a wound. That is Nature's method of healing the wound. Those suckers tend to heal over that wound. But if there is no bud there the limb should in all cases be cut off as close to the trunk as possible, because it is from the main trunk that we get the healing process ; that is, the cambium is the part that causes that growth, and the closer you can get to the place where that healing begins, the better. How many orchards in the country will you find with just such bad pruning as this shows, the great stubs sticking out and very little chance to heal over ? We do not approve of cutting off very large limbs, except under certain conditions when it is unavoidable, but if a tree is started rightly you will never have to come across difficulties of that kind. In trimming trees we want to get something that will make a good smooth wound (holding up a pruning saw). The advantage I find with this saw is that it has a stiff back, making the blade perfectly rigid, which can be brought up with a set screw. That will make a good close cut where the saw will not get a chance to wobble. Of course the teeth of the pruning saw are fine, and well set so that it cuts rapidly. There was a blade on the end for jabbing, but that is a very poor tool, because you will make two or three strikes before you hit in the right place, and those make two or three wounds; and you get two or three suckers to heal over those wounds. The saw is in all cases the best tool to prune with, and makes very little injury to the cambium in cutting, and that is the important part of the tree, for that is the part we get all our growth from, and want to take the greatest care of it. Some might say, "What about the pruning shears ?" They are all right under certain circumstances for smaller limbs, when there is not much resistance in cutting it off, but take the limb of an apple tree where the wood is hard, in order to get that limb off you have to work the shears often, and you work the bark off there, bruise the cambium for an inch, and the wound heals very slowly. We use a long handle on the saw for high trimming. The question was brought up this morning about paring wounds. That is not necessary, because you want to have the cambium protected as much as possible, and if you pare down it will allow the frost to get to the cambium. As all growth takes place from the cambium of the tree, we want to make our wound at a time when that cambium is making an active growth. You will in all cases get the best healing wound in trimming at that time ; that is, in the spring of the year, say, when the sap is circulating. You will be surprised to find how soon a wound will heal. In a very few days you will see the growth coming up between the bark and the wood. Here is a wound showing in cross section, a wound about four inches long, and you can see how the cambium has grown up to heal over the wound. In this case (shown) you have the process almost completed; and here (shown) is the final result, completely healed over; and where you have it healed over in that way the danger to the tree is passed, the wound is entirely gone.

Mr. McNeill : In case decay has set in before the healing is quite complete, will the decay go on after the wound is healed ?

Mr. Hutt: Yes, I think so. I made investigations on trees to find out about that, and cutting them down you will find in some cases that decay has entered into the tree to a certain extent, though if it is completely healed on the outside it is reduced to a minimum. On trees that are vigorous a wound of a reasonable size, say, a wound of an inch, or an inch and a half, will rapidly heal over without any assistance, but in making all large wounds I think it is an advantage to paint them over. Some people object that they do not heal so fast for painting, but my experience is that, though they may not heal so fast, at any rate they heal more satisfactorily, because if you take a wound 2½ inches across, the probability is that unless the tree is growing very rapidly, before the wound is healed over the wood-destroying fungi will have entered at the end and softened the wood, and the limb will rot down to the tree, so that I usually paint them over. A very important thing as regards the healing of wounds is in spraying them well. Spraying has a special advantage besides its usual purpose of stopping the fungous diseases on the fruit itself; that is, these diseases of fungus plants that rot the wood of the tree. In spraying in the orchard I take great care to spray the trunks of the tree, and particularly those wounded surfaces. As the Bordeaux mixture is a fungicide, and as plants or fungi that destroy wood are active here, you have a chance to destroy those germs that have entered on that wood. By spraying them, and then covering them over with paint when they are dry, you will find that that wood will be very hard and last much longer than it would if left open and exposed to rain, which gives a better condition for those fungi to work on the wood and destroy it. Painting would hinder the checking of the wound.

Col. Roger: Did you ever use gum shellac for that?

Mr. Hutt: No, I think it would be a little expensive.

Col. Roger: It is very effective.

Mr. Hutt: It would be a very good thing. What I use is lead paint, just lead and oil, the thicker the better. I have examples of pruning where the limb is cut too long, causing a badly-healing wound, and finally the death of the limb. Here is an example of a torn wound. The limb has been cut off carelessly, probably from the wrong side, and the result of that is that the limb is rotten at one end, the little fungi growing at the other side having rotted the wood. Where it is necessary to take out very large limbs, and where the limb is very heavy, it is difficult to cut it off without tearing it down or splitting it in some way; in that case we usually cut in and then put the cut above to meet it, and then the end breaks off with its own weight, and then you can saw the stub off afterwards.

Mr. Morris: I agree with Mr. Hutt in most of what he has said regarding pruning, but there is one thing in which I do not. My experience and observation, and I think that of all nurserymen, is that you should cut that just above the shoulder. The wound is only about one-third the size, perhaps not that, and it will go on healing there just as quick as though it was cut close to the tree, and it will heal in one-third of the time that it would if cut close to the tree. Now I know nursery workmen that will take off that shoulder. We have to watch them very carefully, check them, and sometimes even discharge them if they continue that.

Mr. Hutt: I am afraid you would have to discharge me, then, if I were around. I know that is a great point of dispute; but you take the extreme case here, and you cut down; where is your line of demarcation?—and as long as you leave any stub you will find there is more or less decay. Now, I go to the other extreme. I do not cut that off where the healing starts. If you have not stopped the circulation, the sap will cause that to heal there, but I find—and I have practiced this for quite a long time—I can get a better result by cutting closely, even though the wound is large.

Mr. Morris: With a thrifty growing tree it is not a matter of much importance, it will heal over anyway; it is only a difference of opinion as to which is better. There is another question that I would like to refer to Prof. Van Deman. He and Prof. Waugh advocated low-headed trees, while Mr. Hutt was speaking in favor of tall and high-stemmed trees. My observation leads me to believe that a low-headed tree or a low-headed orchard makes a far better orchard than a high-stemmed tree. He quoted

two limbs of the Greenings coming down. Well, now, they will come down the same way on a tree if the stem is 10 feet high. My model of a tree would be a stem perhaps four feet, and then train your first limbs up and you get your head just as high as the other way. These limbs that you start low tend to shade the trunk. It is very important to keep your trunk healthy, and with those tall-stemmed trees you cannot do it, the wind bends them over. Here we have prevailing in most parts of Canada southwest winds. When the soil is wet those winds blow those trees and lean them to the northeast, and just as sure as they get leaning to the northeast that tree is going to die every time. The sun will burn them on the southwest side, and then perhaps the borer gets in, and suckers will start from the bottom and the tree will soon die.

The President: Then you believe in sun-scald?

Mr. Morris: I believe in sun-burning. The sun will burn when the tree gets that size (showing). If the sun will strike that on the southwest side that tree is going to die.

Prof. Van Deman: I do not think there is any difference of opinion between any of us that have talked here and those that they have talked to in regard to that matter of sun-scald. It is merely a name. We may differ in the interpretation of the name. I do not think that any of us believe that the sun actually cooks the sap or cooks the living part of the tree, but the damage is there, and we call it sun-scald. Of course it is the effect of the violent changes in winter time when this thing occurs. That is the whole cause of the trouble, and we say it is sun-scald. Of course the sun has an effect on it, it is the original cause, and if the tree is thoroughly shaded by some of those tree protectors, or even by the branches sometimes, though they may be stripped of leaves, they are sufficient to prevent any trouble of that sort. In regard to the matter of high-headed trees, I am fully convinced that a low-headed tree is best, but I would not say that it should be so low that there was no possibility of getting any tool under the branches, and I perfectly agree with Mr. Hutt in having trees trained at such a height that it is possible to get a low running instrument under the branches. Of course up next the body of the tree after it reaches bearing age there is no real necessity to stir the ground. There is nothing but large roots there then, and the shading of the tree will necessarily keep down all vegetation, and the thing will regulate itself very well, but I do not believe in this horse-high pruning, so that we can drive a waggon under it and all that sort of thing. That is what I am objecting to. I would rather have the good common sense of any ordinary person than I would all the hifaluting notions of people that have fancy ideas about pruning. Now, Mr. Wellhouse of Kansas is perhaps a little extreme in his ideas about orchard pruning; he does not prune but very little, and one of the first things that he asks any man that is to be hired to work in his orchard is, whether or not he is a good pruner. If he says yes, Mr. Wellhouse replies, "I do not want you.' He does not want anyone with any preconceived notions, beause then they are sure to do what they think instead of what he thinks, and so he would rather have somebody that knows nothing about the business; and then they are in that instructive state of mind; and I think that is the policy that we ought to follow out in a reasonable manner here or anywhere—to get people who will prune according to our ideas. We want to be sure to have our ideas right, and not to get any of those fancy Old Country pruners who know it all; they are just the ones that will do lots of damage, and as Mr. Hutt said this morning there are a great many people that judge their skill at pruning by the amount of brush they make—the more brush the more skill—and that is the worst kind of heresy. As to the place at which to cut off the branch in pruning ,I may say that pruning is vegetable surgery, and should never be performed except when there is absolute necessity, any more than we should have one of our limbs cut off.

The President: There are no new limbs coming out on us.

Prof. Van Deman: No, and it is with great difficulty we can have a new one when we cut one off a tree. I would try to make the wound as small as I could, to remove all of that branch that we do not need, and I would get just as close to the tree as I could without actually scoring the body of the tree. (Hear, hear.) That one

here (showing one close to trunk) is to my notion. I would not cut right jamb up to the tree, but I would begin exactly in the fork, and I would cut so that I had very little slope upwards, and you will find that wound will heal over better than a wound like this. (Showing).

Col. Roger: If you had a tree and you found you had to cut off a branch as large as this (about 2 inches), and the sap were flowing freely, and you were afraid that sap would flow down here, would you consider it necessary to cut that down half a foot or so, and afterwards cut it off?

Prof. Van Deman: No. It won't hurt a grape vine to cut it if it bleeds so that it runs like a maple tree in the spring time. I have left them till then and pruned them then to see, and it makes no difference. There is nothing but a little water runs out.

Mr. Morris: Is it as good to prune a grape vine, then, as it is in the fall?

Prof. Van Deman: Oh, no; I would not want to do it. You are in danger of breaking the buds and all that sort of thing.

Col. Roger: It is not desirable to prune when the sap will run, but sometimes you have to do it.

Prof. Van Deman: If I had my choice of the time of year to do the pruning of apple trees and pear trees it would be just about midsummer, as a rule. When you prune when the leaves are off it will invigorate the trees; that is, it will cause them to send out a lot of water sprouts. If you prune in the summer time they will not grow, and the wound will heal over quicker there than if you prune at this time.

Mr. J. Tweddle: What about the loss of foliage?

Prof. Van Deman: That is nothing. I do not believe in pruning a tree till you really hurt it.

Mr. Morris: Would you get into the trees at that season?

Prof. Van Deman: I would not want to climb into the tree, I would want to stand on the ground. Of course big trees are another problem. As to the saw; I should have one of those stiff-backed saws with a little narrow blade. A medium sized butcher's saw is the nicest thing for grafting or pruning that I ever tried. I want this so that I can screw it up and make it as tight as I like. There is no sense in trimming off that wound. I would just as soon leave it as the saw leaves it as any other way, and paint it over and leave it that way. I want to say one thing more on the matter of grafting. If I pride myself on anything in horticulture it is being able to graft well; and since the spring of 1867, when I found out the right way to graft, as I call it—top grafting—I have never made a square cut. I always cut at the angle of 45 degrees, and put in one scion. I never cut a branch so big that one scion would not be sufficient. Even if it is 2½ inches in diameter I just put in one scion. I just begin at the top and saw it right down at a very sharp angle, and then with my knife I cut off the top and put my scion on there. Lots of times you can set that graft without ever making a crack.

The President: It is a cleft graft.

Prof. Van Deman: Yes; I graft a great many ways, but that is about the best way.

Col. Roger: What wax do you use? How do you make it?

Prof. Van Deman: I use one part of tallow, two parts of beeswax, and four parts of resin. That will make a wax that will work in almost any weather when you are able to do grafting. You can remember it thus—1, 2, 4.

Mr. Caston: When you graft on a limb as large as that, suppose you were working on the top of a young tree, how would you go out farther on the limb?

Prof. Van Deman: That would depend altogether on the tree. If it was a very small tree I might cut the whole thing off and just put on one scion and have a straight scion of it, but as a rule I would rather go up to where I had several scions to put in and make them smaller. Rather than cut the great large limb like my arm I would go higher. Never cut off closer to the fork than about 4 inches, because if you happen to fail you can let a few sprouts grow on that, and the next year you have room to make another cut a little farther back.

The President: Would you prune at this time of year?

Prof. Van Deman: Yes.

The President: Would you prune pear trees?

Prof. Van Deman: Yes.

The President: And plum?

Prof. Van Deman: Yes, I might.

The President: Just as readily as you would apple?

Prof. Van Deman: I think so; I have done it, and I have pruned peach trees at this time of year, although I usually prune peach trees pretty well towards spring time.

Col. Roger: I like to begin to prune just as soon as the blossoms have dropped off the tree.

Prof. Van Deman: That is all right.

Col. Roger: My object is to destroy as little as possible of the growing fruit.

Prof. Van Deman: Well, you cut the fruit off when it is in the bud in the winter time.

Colonel Roger: But I am not so apt to disturb the other fruit.

Prof. Van Deman: You do not seriously hurt anything.

Col. Roger: It is better to do it then than to leave it later.

Prof. Van Deman: No, if I had my choice I should do the pruning on my apple and pear trees in midsummer, about the end of June or the middle of July.

Col. Roger: I think one of the best things I ever invented for orchard economy is what I call the wheeled step ladder. I made a special ladder, and instead of letting the front legs run to the ground I mount the front legs on two old buggy wheels and run an iron axle through, and then put the handles back here so that I can lift the whole thing up like a wheelbarrow, and I have a platform to carry my tools on, and I wheel that thing around, and I run up on the sides and stand on that instead of the tree, and I can reach all round the tree, and when I get one side done I wheel it around to the other side; and when it comes to picking apples I have three sizes of those step ladders, from 5 feet high to 12 feet high, and I can put a man on that step ladder and he will pick twice as many apples than if he used the ordinary step ladder, and he does not injure the tree. I will send you a photograph of that step ladder if you like. I do not want to patent it. I have mentioned it here because I know people will say that is a good idea.

HYBRIDIZING NUTS.

By Arthur Harvey, Toronto.

I wish you to bring to the notice of your convention the subject of hybridizing nuts. I have some right to ask your attention to a subject of the kind, because I have a long experience. When Secretary of the Horticultural Society of Hamilton, in the fifties, I remember urging the cultivation of tomatoes! Again, I was a pioneer in grape culture, and it is curious to think that forty years ago there was not a ton of grapes grown for the market, let alone wine-making. And, apropos of this, let me say that so long as we depend on the hybrids of Vitis Labrusca we shall never make a good, palatable wine; we have to begin over again from the Vitis Riparia, to get rid of the foxy flavor, and if we can get that other hybrid early and sweet enough, we shall do. However, to our nuts. I have tried in vain to hybridize the native hazel with the English filbert and the Kentist cob-nut, both of which I grow, but they do not flourish. I understand the botanical difficulty. The Ottawa Experimental Farm folks have tried, too; I have sent them pollen three times; no use. I think it may be done yet, and why do not some of you clever folks try it? Again, I have tried to grow the English walnut, but it is too tender. I have tried to graft it on our native black walnut, but, so far, no result. I shall try again. Why do not some of you try to hybridize the English walnut and our native kind? Mr. Pafford of Niagara has an English walnut in good bearing, and I am sure you could get his help. What a benefit it would be to our country to

have a nice soft-shelled fruit instead of the hard, thick-shelled nut which it takes a squirrel or a pig to get the kernel from !

Prof. Van Deman : The Persian or English walnut has been crossed with the Ontario walnut of California by Newton Burbank, and there is a little progress made, but with the common Eastern walnut it has not been crossed as far as I know ; but there are varieties of that European walnut growing now in the vicinity of Buffalo. Down at Lockport there is a large bearing tree. It will grow in Canada if you only get the hardier varieties.

VOTES OF THANKS.

Mr. T. H. Race : I am never in favor of votes of thanks in any form or way. I do not believe in a formal vote of thanks ; I believe that if thanks have any value the expression should be spontaneous; and we have no resolutions at all written or framed. but I would move, since we have had abundant reason to feel spontaneously thankful to the people of Cobourg, that the gratitude of this Association be expressed and tendered to the people of this beautiful Town of Cobourg for the splendid accommodation they have afforded us in all our several meetings since we came here.

The resolution was seconded by Mr. Scarff and carried amid applause.

Mr. Race : Our committee would also move their hearty expression of their appreciation of the efforts put forth by the local Horticultural Association in recognition of their splendid efforts and energies to make this gathering such a success as it has been. We see the results of their efforts in the several sessions of this meeting, and I think it is due to them that we should give a strong expression of our gratitude and appreciation of all they have done in developing and creating an interest throughout this district in behalf of this meeting.

Mr. A. McNeill : I would second that motion, and couple with it just a suggestion that this might be taken as a lesson in what can be done by an organized effort. It certainly was a splendid performance, and the thousand and one little courtesies that would scarcely strike the average stranger have been appreciated by the members of this Association most heartily.

The resolution was carried by a standing vote amid applause.

The Convention then adjourned.

INDEX.

	Page
Annual meeting	7
Apple barrels	30
Apples	150, 151
Apples, cross fertilization	36
Apples, seedlings	14
Appliances, Report of Committee on	140
Bees and fruit	31
British Market for Canadian fruit	48
Burke, Rev. A. E.	13
Canadian and American fruits	45
Caston, G. C	37
Codling Moth	7
Cold storage	63, 157, 158
Committees	7, 117
Creelman, G. C	105
Cross fertilization of apples	34
Dawson, H. W	91
Dempsey, Walter, address	150
Fairs and Societies, Reports on	10
Financial statement	53
Fisher, G. E	18
Freight on fruits	91
Fruit Baskets, Report of Committee	27
Fruit Marks Act	128
Fruit in Simcoe county	37
Grafting	31
Grapes, Profitable	147
Harvey, Arthur	165
Horticulture, Possibilities in	109
Horticultural Societies	105
Hutt, Prof. H. L	13
Hutt, W. N	117
Jackson, J. G	94
Jones, Harold	99, 151
James, C. C	109
Macoun, W. T., address	141
Medals at Pan-American Exposition	116, 158
Morris, E.	31
New Fruits	13
Nuts, hybridizing	165
Officers for 1902	6
Orr, J. E	100
Orr, W. M	54
Packages, Report of Committee on	140
Pan-American Medals	158
Peaches, seedling	15, 16
Pears, seedlings	15
Pettit, Murray	147
Plums, seedlings	15
Plums, American and Nigra	141
Pomological Societies	11, 12
President's Address	54
Pruning	117, 161
Quebec Orchards	126
Question Drawer	152
Raspberries, seedlings	16
Resolutions	158
Robertson, Prof. J. W	48, 63, 128
Rose Growing, Amateur	94
St. Louis Exposition	99, 160
San Jose Scale	18
Saunders, Dr. Wm	31
Sheppard, R. W	126
Shipment of Fruits to Great Britain	63, 75
Smith, E. D., Report on	27
Spraying	100
Stevenson, E. B	140
Strawberries, promising new	140
Tweddle, Joseph	7
Transportation, Report of Committee	148
Van Deman, Prof	45
Votes of Thanks	166
Woolverton, L	75

REPORT

ON THE

ONTARIO FRUIT EXHIBIT

AT THE

PAN-AMERICAN EXPOSITION

1901.

APPENDIX TO THE REPORT OF THE FRUIT GROWERS' ASSOCIATION.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

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REPORT OF THE ONTARIO FRUIT EXHIBIT

AT THE

PAN-AMERICAN EXPOSITION BUFFALO N.Y. 1901

REPORT OF THE SUPERINTENDENT.

Mr. C. C. James, Commissioner for the Province of Ontario:

Dear Sir,—I herewith have the honor to submit to you a report of the progress and results of the work under my supervision in connection with the Ontario Fruit Exhibit in the Horticultural Department at the Pan-American Exposition.

Upon receiving the appointment of Superintendent of the Fruit Exhibit for the Province, in the month of March, arrangements were at once set on foot looking to the preparation and instalment of an exhibit which might be calculated to advertise the climate and resources of Ontario, and to maintain the high reputation which the Province had already gained for the production of the fruits of the temperate zone in the greatest profusion and of the highest quality.

I found that no extensive preparations had been made during the previous season, with a view to exhibiting in horticulture at Buffalo. However, under instructions from the Department of Agriculture of the Province, Mr. L. Woolverton, of Grimsby, had secured and packed in the most careful manner about 200 boxes of apples, comprising thirty of our standard fall and winter varieties, and had placed them in the hands of the Buffalo Cold Storage Company, to be held until required for the tables. This fruit proved most satisfactory in all respects, and clearly demonstrated the great possibilities of cold storage for our apples in seasons of large supply.

This subject will, however, be more fully taken up in another section of this report.

A circular was at once issued to the fruit growers and packers of the Province, soliciting contributions and co-operation in connection with the installation of the Exhibit. This was responded to quite freely, although in many instances it was stated that no material assistance could be rendered until the season's crop should be ready. A number of firms, notably Messrs. Shuttleworth & Harris, of Brantford, manufacturers of pickles and relishes; the Ontario Grape Growing & Wine Manufacturing Co., of St. Catharines; the J. S. Hamilton Company of Pelee Island and Brantford; the E. Girardot Wine Company of Sandwich, all of whom are manufacturers of native wines; L. M. Schenck & Co., of St. Catharines, manufacturers of canned goods; A. Bain, of the Springbank Mineral Water Company, St. Catharines, and R. J. Graham, of Belleville, manufacturer of evaporated and dessicated fruits and vegetables; requested space in the allotment at our disposal, which was granted, and resulted in each of these firms setting up an exhibit, that proved of value to themselves, and added a great deal to the general appearance of the entire display.

The Spramotor Company, of London, had also requested space for the installation of their exhibit, but owing to the crowded condition of the section it became necessary for this company to set up their display in the North Conservatory, adjoining the Horticulture Building, where it attracted a great deal of attention.

The Horticulture Building, which was rectangular in form, was divided into sections radiating from the centre, giving a very unique and pleasing effect and bringing every exhibit into almost equal prominence. The larger portion of Section M, south of the main aisle was alloted to Ontario ; the State of Wisconsin occupying the remainder. The State of Florida and the exhibit of Los Angeles Co., Southern California, occupied the sections on either side, the contrast between the exhibits of these semi-tropical countries and those from the Province of Ontario was very striking, and the effect produced upon the minds of visitors was most favorable to our Province. Including Nova Scotia and Mexico there were forty-one States and countries exhibiting in the Horticulture Building, under the superintendence of Mr. F. W. Taylor. I am pleased to say that our relations with the representatives from these various countries was at all times of the most cordial and friendly nature ; and while between ourselves and many of the northern States, there was more or less competition, at no time did this friendly rivalry give rise to any ill feeling or misunderstanding.

It was deemed advisable that the general appearance of the exhibit and the installation connected therewith, should be in keeping with the prominent place which it was expected Canada would take at the Exposition. With this end in view a plan of arrangement was adopted which proved very satisfactory, and resulted in the erection of a facade and series of pedestals and tables, which displayed the various exhibits to good advantage, and elicited many favorable comments from visitors from all parts of the world. In this connection special reference may be made to a series of carved projections representing typical cornucopias overflowing with fruits and vegetables indigenous to the Province. This piece of work was carved in relief by James Carty, of St. Catharines, to whose skill and mechanical ability a large part of the credit of the entire construction was due. All the work connected with the installation of the exhibit was performed by Canadian workmen, under contract from Canadian firms, and certainly brought no discredit on any of them, when placed beside the workmanship of the best thought and skill of American builders engaged in the construction of booths at the Exposition. The general construction was supplemented by and embellished with a number of silk banners, including the Union Jack, the Royal Ensign and the Dominion and Ontario coats of arms ; in addition, a number of appropriate pictures and fine specimens of mounted deer's heads and native birds were kindly loaned by the Department and by several patriotic gentlemen from St. Catharines. As will be noted elsewhere, an award of a Silver Medal was made by the jury in this department for "Installation of Exhibit," similar awards being made in this building only to the State of California.

One of the greatest factors in the embellishment of the tables during the entire season, and one in which it may be said Ontario excelled, was the continuous display from May 20th until the closing day of the Exposition, of large quantities of cut flowers and ornamental plants. For this feature we are indebted largely to Mr. Wm. Houston, Florist at the Central Prison ; Messrs. Morris, Stone & Wellington, of the Fonthill Nurseries, and Mr. James Wilson, Superintendent of Queen Victoria Park, who, through Mr. Cameron, sent in continuous displays from week to week. It is to be regretted that these gentlemen, through a technical oversight, failed to receive from the Exposition Jury, the recognition to which their displays entitled them.

In giving a summary of the exhibits of the various fruits as they came in season, it is well to bear in mind that owing to the perishable nature of a display of fruit, the aspect of the exhibit would naturally change from day to day, and it required constant attention and unremitting effort to maintain the high standard that was aimed at, and that was to be expected from the Province of Ontario.

Fruits in glass. This display, for reasons previously stated, was of moderate extent. A central pedestal was erected, and on this was placed some three hundred jars of domestic canned fruits, obtained from a number of fruit-growers throughout the Niagara District. This exhibit was supplemented later by a very excellent collection of strawberries, raspberries, gooseberries, and currants, in solution, prepared by Prof.

Hutt of the Ontario Agricultural College. These fruits, together with exhibits from Mr. Caston, of Craighurst, Mr. Woolverton, and Rev. E. B. Stevenson of Jordan, proved very interesting and instructive.

Strawberries. This was the first fruit of the season's growth to make its appearance on our tables, and while supplies were sent in quite early to some of the exhibits from the more southern States, Ontario displayed strawberries fully a week before the State of New York, and for some time kept far in advance of that important State, with regard to this most beautitul and valuable fruit. In all there were over forty varieties of strawberries displayed, a list of which may be found at the close of this report. The season lasted from June 11th to July 6th, and during this time a large and attractive display was maintained. A new strawberry, named the Ryckman, appeared upon the tables of Chautauqua County, New York, which gave promise, as likely to prove of great value.

Cherries. Owing to the almost entire failure of the cherry crop in the Province, the display of this fruit was not large ; only fifteen varieties were exhibited and the principal contributors of this fruit were Messrs. Orr of Fruitland, Stewart of Homer, and Orser of Bloomfield. The cheeries sent in by Mr. Orr showed the benefit to be derived from regular and sytematic spraying, as the fruit was invariably in perfect condition. A very large black cherry, named the Bing, was shown by some of the western States, and attracted a great deal of attention, and the Windsor, a Canadian seedling, also took a very prominent place. These cherries are worthy the notice of our fruit growers generally. The cultivation of this fruit, both sweet and sour, may very well command more serious attention, as the market is far from being fully supplied.

Raspberries. The Cuthbert, amongst the reds, and the Gregg, from the blackcap family, carried off the honors for this fruit, both in quantity and general good qualities ; about ten varieties were exhibited in all; of the newer kinds the Louden seemed to be the most promising.

Blackberries. In this fruit the display was somewhat limited; about seven varieties were shown, the chief of which were Lawton, Kittatinny, and Snyder. A most magnificent blackberry was displayed by New York State from time to time, called the Rathbun. It is of enormous size, beautiful appearance, and excellent quality ; possibly it may be somewhat tender.

Currants. Considerable competition arose in connection with this fruit, as the supplies were plentiful, and the quality and appearance quite up to the standard. During the season our tables were abundantly supplied with choice plates of Cherry, Fays, Wilder, White Grape, and Black Naples, with occasional contributions of over twenty other kinds. The Wilder currant is considered by our New York friends as a most valuable variety on account of its size, productiveness and ability to hang for a great length of time on the bushes. A new climbing currant, called the Chatauqua, gave promise of being worthy of propagation.

Gooseberries. The exhibit of the large varieties of Gooseberries, which was made by Ontario quite eclipsed any shown in the building during the season. The enormous size of the specimens of Whitesmith and Industry that were shown by Messrs. Merritt, Beattie, and Sexton of St. Catharines, proved a source of astonishment and wonder to the visitors from the south, while to those from Great Britain, they seemed to bring back recollections of the English Gardens. In addition to these very large fruits, fine specimens of over thirty other varieties were shown. The displays of Messrs. Stanley Spillet, of Nantyr, and C. L. Stephens, of Orillia, deserve special mention.

Plums. The plum crop of the Province was quite uneven the past season, and some large plum sections experienced quite a failure ; however, from a number of constant exhibitors, a continuous display of plums was kept up, extending from July 30th until the middle of October. In all eighty varieties were shown during this time. Considerable interest was manifested in the samples of the newer varieties of Japanese plums, grown and exhibited by James Titterington of St. Catharines, of which, perhaps,

Wickson, Paragon, Shiro, Climax, Gold and President, were the most interesting, all being from large to very large in size, and most beautiful in appearance. Exhibits of plums were received from nearly every fruit section in the Province, and were probably representative of a greater numbr of localities than any other fruit shown.

Peaches. Much to the astonishment of exhibitors from the various States, Ontario took a most prominent place during the peach season, again displaying samples of home-grown fruits some days in advance of New York State. Michigan, which was fortunate in having a very heavy crop in many sections, proved our strongest competitor, and made a most excellent display of peaches at different times. The Ontario tables were, however, from the time that the Alexanders first made their appearance until the close of the Exposition, never without a creditable showing of this valuable fruit, and at times the display was large and remarkably fine. In all some sixty-three varieties were shown from time to time. The exhibit of this fruit no doubt accomplished a great deal towards enlightening the minds of those who had not given the subject careful thought, as to the climate of the Province and the large area in Ontario over which so valuable and tender a fruit as the peach may be successfully and profitably produced. A few of the most valuable yellow peaches not generally known may be said to be Engol's Mammoth, Chair's Choice, and Fitzgerald, all ripening their fruit later in season than Early Crawford. A new yellow peach named the Purdy, a Canadian seedling, was considered by the judge of fruits as very promising.

Grapes. Supplies of grapes came in quite freely from the time the season opened until notice was sent out to cease forwarding. In all over 100 varieties were placed on exhibition. It is the general opinion, however, that the list may be cut down very considerably, and still comprise those kinds which have proved of exceptional value. In addition to outdoor grown grapes, several choice varieties of house-grown grapes were shown, contributed from the houses of Thomas R. Merritt, of St. Catharines. With the single exception of apples, no other fruit on exhibition took so prominent a place with us as did the grape. It was universally admitted, notwithstanding the fact that large and varied displays were sent in frequently from the grape sections of the United States, that for size and beauty of cluster, for variety of fruits, for quantities displayed, and for the general excellence of the exhibit, Ontario grapes stood in the front rank. The full and complete collection shown by Mr. Murray Petitt of Winona, which captured a Wilder medal, and the beautiful clusters from the vineyards of Mr. F. G. Stewart of Homer, and Mr. Albert Pay of St. Catharines, were especially fine, but the exhibits in this class were so numerous and of such uniform quality that individual mention can scarcely be made. A Canadian seedling named the Lincoln, originated by the late W. H. Read of, Port Dalhousie, drew the attention of many of the largest grape-growers of the United States as giving evidence of valuable qualities as a commercial grape.

Pears. This display was well maintained and a fully supply of seasonable varieties were furnished from the Whitby and Burlington Districts, from the west, and also from nearly every exhibitor in the Niagara District. Fifty varieties were shown during the season. Owing to the favorable prospect for the successful exportation of this class of fruit, a great many fruit-growers are turning their attention to the production of pears that may prove suitable for this purpose. In the case of this fruit also a great many varieties may be without much hesitation laid aside, and attention confined to the growth of those kinds which give promise of meeting the demand of the English market. The export trade in pears is likely to assume large proportions, and only such varieties as the Bartlett, Duchess, D'Anjou, Bosc, Louise Bonne, Clairgeau, and possibly the Keiffer, should be planted on a large scale. The market for pears in this country is fairly well supplied at the present time ; pears occasionally selling for less than good varieties of apples at the same season. It would appear, however, that a large market for the right kind of pears is opening up in Great Britain, as soon as shippers can be assured of reasonably safe transportation. Messrs. Vanduzer & Griffith,

of Grimsby, exhibited a case of choice Bartlett pears packed for export, which attracted the attention of many large fruit-growers and shippers.

Quinces. A few choice samples of this fruit were shown, in some cases the specimens being extremely large and fine.

Apples. Notwithstanding the fact that Ontario prides herself in producing fruits in great variety, the apple, after all, is the fruit par excellence in this Province. It was with respect, therefore, to this fruit that the other exhibitors were especially anxious to learn what position Ontario would be likely to take amongst them all. It certainly is a source of satisfaction that notwithstanding the very great failure of the apple crop the past season, and the somewhat limited preparation made in 1900, for this exhibit, we were able after all to take our rightful place amongst the large apple producing sections of the United States. Commencing with a display on May 20th of some 700 plates of apples, comprising over thirty varieties, taken out of storage in as fresh and perfect a condition as if just picked from the tree, we maintained an exhibit of fruit of the previous season's growth right up to the close of the Exposition, and had at that time apples in reserve, of which, when the cases were opened at Cobourg in December, from 92 to 100 per cent. were found to be still in sound condition, after fourteen months' storage. The object-lesson was an extremely valuable one, conclusively proving to thousands of fruit-growers, both Canadian and American, not only the excellent keeping qualities of Ontario fruit, but also the vast possibilities that there are to be found in the intelligent, careful harvesting of the apple after it has been well grown; and that it is not at all necessary in seasons of extra large supplies that so much of this valuable crop should be wasted for lack of market for it in the fall. Let the apples be carefully gathered and packed in proper season and immediately placed in suitable cold storage, and the owner is at once master of the situation. It must be remembered, however, that cold storage will not work miracles. It will not restore fruit that has been bruised or badly handled, or allowed to become over-ripe ; but if the initial conditions are carefully attended to, it is quite possible to find after six to eight months' storage that the fruit is still in excellent condition. It does not follow by any means that fruit so packed, and held the length of time mentioned should of necessity fall down immediately it is exposed to normal temperature. Apples of this class were placed on the tables time and time again in the hottest weather, and their keeping qualities were remarkable, the fruit remaining in good condition for weeks after removal. With the exception of New York State, Ontario's exhibit of 1900 apples was superior to any other in extent, variety, and economic value of the kinds shown. Although in many sections of the Province the crop of 1901 was an absolute failure, still the Province is so large and the conditons are so varied that it was possible even in such an "off" year to fill up the tables with specimens of fruit that for quality were unexcelled. Over one hundred and forty different varieties were displayed in September and October, and our space became so crowded that we were compelled to obtain extra accommodation in which to extend our exhibit. During the meeting of the American Pomological Society, and in connection with the competition for the Wilder medals, in addition to a number of extra tables furnished for the purpose, the State of New York kindly permitted the use of a portion of their space for the display of the Experiment Station's Exhibit. At a later date a large stand, surrounding one of the main pillars of the building, was made use of as an overflow exhibit. While there were many exhibitors of apples, special mention must be made of the fine displays sent in by W. H. Dempsey of Trenton, R. J. Graham of Belleville, Wm. Rickard of Newcastle, and Prof. Macoun of the Central Experimental Farm, all of whom were recipients of honors. No doubt a great factor in the improvement of the quality of our apple product is due to the almost universal practice that now obtains of spraying the trees during the season, and it should be a matter of congratulation amongst our growers to learn that a spraying outfit of Canadian manufacture received the highest award and only Gold Medal granted for spray pumps at Buffalo. This award was made to the Spramotor Company, of London, whose exhibit was well worthy of the attention it secured.

Miscellaneous. Under this head may be placed the exhibits of nuts, tropical fruits and vegetables that were sent in from time to time. Special mention may be made of the exhibits of melons and tomatoes, which for quality was not excelled. Canadian tomatoes ripened out of doors were displayed at a very early period, again showing our climate in a most favorable light.

While it became necessary to secure occasional supplies of fruit by purchase, in order to keep a full display of fresh and seasonable fruits before the public at all times, it is certainly due a large number of public-spirited and patriotic fruit growers and shippers that reference be made to the hearty manner in which response was given, from time to time, to calls for supplies ; this was so universal that nearly every section of the Province was to a greater or less extent represented, and it is largely owing to this fact that the Province of Ontario again, as on previous occasions has taken her proper place as a land blessed with a climate most magnificent, a soil most fertile, and a people most patriotic and progressive.

It became every day more apparent that it was a wise conclusion on the part of the Department of Agriculture, when it was decided to place an exhibit of fruit in the Horticulture Building; in fact, a serious error would have been made had this been omitted. Valuable and important as her other exhibits of the forest and the mine undoubtedly were, there was no display that seemed to catch the popular eye or fasten the attention of the public on Ontario so frequently as that of her fruit, and there is nothing else that can impress upon the mind so forcibly the conditions of climate and environment. In this respect Ontario scored a complete success, as was attested hundreds of times by the exclamations of wonder and delight that were given expression to by visitors from day to day. The Ontario section was also a headquarters for Canadian visitors, and special efforts were put forth in this respect so that every Canadian was made to feel that beneath the flag of his native country there was a welcome and sense of restfulness and solid enjoyment which he could find nowhere else as fully or as well. There is no doubt that we will also profit to no small extent by an influx of progressive cultivators of the soil, men who were favorably impressed with the possibilites and resources of Ontario from the standpoint of the orchardist and fruit-grower.

In tangible results the fruit exhibit received from the Juries of the Pan-American Exposition, awards of twenty Gold, thirty-five Silver, and forty-four Bronze Medals, and one hundred and sixteen diplomas of Honorable Mention, in recognition of the value and importance of the exhibits.

Comparisons are unnecessary. It may be said, however, that this record was far in advance of any other State or country, with the exception of New York State.

It is scarcely necessary that I should do more than refer to these very important results, inasmuch as full details have already been published broadcast by the press and are generally well known. I trust, however, that the efforts put forth by the fruit-growers of the Province to represent Ontario's Horticultural interests at the Pan-American Exposition may be productive of lasting good, and may prove an incentive to further achievement.

In closing, permit me to refer to the uniform courtesy that was extended to your representative by the Exposition officials and the Customs officers during the entire season, and to express my appreciation of the great care manifested in the examination of the various exhibits from day to day by the Juror of Pomology, Prof. H. E. Van Deman, whose awards were made only after the most painstaking consideration.

I am also greatly indebted to my assistants, Messrs. J. J. Collins and Robert Thompson, and to Miss K. House, for their constant and faithful attention to the duties and responsibilities devolving upon them.

It is to be regretted that the unfortunate financial position of the Exposition Company at the close has prevented them from keeping faith with the exhibitors, with regard to supplying the medals awarded. It is hoped that some other means may be devised whereby they may be furnished to those who have won them.

I remain your obedient servant,

WM. H. BUNTING,

St. Catharines, January 1st, 1902. **Superintendent.**

OFFICIAL LIST OF AWARDS IN HORTICULTURE.

Gold Medals.

Department of Agriculture, Province of Ontario—	Display of native wines.
" "	Collection of strawberries.
" "	Display of grapes, house-grown.
" "	General display of grapes.
" "	Display of plums.
" "	Continuous display of peaches
" "	Display of pears.
" "	Display of apples, crop of 1901.
" "	Display of apples, crop of 1900. June 7.
" "	Display of commercial apples, 1900, Aug. 17. In export cases, 97% sound.
" "	Display of apples, crop 1900, Oct. 12. Cold storage.
" "	General display of fruits.
Brennan & Son, J. F., Grimsby	Display of peaches.
Dempsey, W. H., Trenton	General display of apples.
Orr & Son, W. M., Fruitland	Continuous display of fruits.
Pay, Albert, St. Catharines	Continuous display of fruits.
Railton, A., Fonthill	Continuous display of fruits.
Titterington, James St. Catharines	Continuous display of fruits.
Stewart, F. G., Homer	Display of fruits.
Woolverton, L., Grimsby	Display of fruits.
Spramotor Co., London	General display of spraying and whitewashing pumps and machinery.

Silver Medals.

Department of Agriculture	Installation of exhibit.
" "	Display of canned fruits and vegetables.
Ontario Agricultural College, Guelph	" bottled fruits.
Shuttleworth & Harris, Brantford	" pickles and relishes.
Armstrong, Wm., Queenston	" fruits.
Beattie, Thomas, St. Catharines	Collection of fruits.
Bunting, Gordon, St. Catharines	" "
Boyt, George, St. Catharines	Display of asparagus.
Burlington Horticultural Society	Continuous display of fruits.
Collinson, S. & W. H., St. Davids	Display of fruits.
Central Experimental Farm, Ottawa	" apples.
Dempsey, Harry, Rednersville	" "
Freel Bros., Niagara	" fruits.
Graham, R. J., Belleville	" apples.
Griffis, Alfred, St. Catharines	" fruits.
Huggard, R. L., Whitby	" "
Merritt, T. R., St. Catharines	" "
Ontario Experimental Fruit Stations	" "
Pay, Albert, St. Catharines	" asparagus.
Peck, Francis, Albury	" apples.
Peer, George N., Burlington	" fruits.
Pettit, M., Winona	" "
Purdy, C. F., St. Catharines	" Purdy peach.
Read, M. A., Port Dalhousie	" seedling grape, "Lincoln."
Read, M. A., Port Dalhousie	" fruits.
Rickard, Wm., Newcastle	" apples.
Secord, C. E., St. Catharines	" fruits.
Shephard & Son, J., Queenston	" "
Smith, A. M., St. Catharines	Continuous display of fruits.
Stephens, C. L., Orillia	Display of fruits.
Tweddle, Joseph, Fruitland	" "
Thompson & Son, Robert, St. Catharines	Continuous display of fruits.

Wilder Silver Medals.

Ontario Experimental Stations.....Display of fruits.
Pettit, Murray, Winona..... " grapes.
Pay, Albert, St. Catharines ..... " fruits.

Bronze Medals.

Adams, E. P., Queenston ....Collection of fruits.
Bradley, H. C., Queenston . ..... " "
Bartlett, John, Oshawa .....Display of apples.
Cockburn, J. P., Gravenhurst ..... " "
Cameron, R., Niagara Falls South ..... " dahlias,
Currie, R., Niagara..... " fruits.
Culp, S. M., Beamsville..... " "
Chaplin, W. H., Newcastle ..... " apples.
Dunn, Joseph, St. Davids ..... " fruits and nuts.
Fallis, Robert, Harriston ..... " apples.
Fisher & Son, C. E., Queenston ..... " fruits.
Graham, R. J., Belleville .....Evaporated fruits and vegetables in glass.
Horning, George, Waterdown .....Display of apples and pears.
Hagaman, Thomas C., Oakville .... " Wealthy apples.
Hambley, J. E., Cedar Springs .....Collection of peaches and apples.
Hilborn, W. W., Leamington .....Display of fruits.
Hopkins, W. V., Burlington..... " "
Honsberger, C. M., Jordan Station..... ..... " "
Jackson, W. K., Niagara .... " "
Kivell, F. H., Bridgeburg..... " grapes.
Leckie, J. A., Clarkson's ..... " apples and pears.
Law, George, Niagara Falls South .... " fruits.
Lowrey, Charles, Queenston..... " "
McGregor, James, Whitby ..... " apples.
Morden, E., Niagara Falls South..... " fruits.
McLaren, J., St. Catharines..... " Bosc pears.
Morris, Stone & Wellington, Fonthill ..... " plums.
Orser & Son, Bloomfield ..... " Olivet Cherries.
Peart, A. W., Freeman .....Collection of fruits.
Patterson, James A., St. Catharines .....Display of fruits.
Randall, J. De. W., Niagara.....Display of figs.
Sexton, John. St. Catharines .....Display of gooseberries.
Scott, John, St. Catharines ..... " fruits.
VanDuzer & Griffith, Grimsby..... ..... " "
Shephard, R, W., Como, Que .... " Fameuse apples.
Stevenson, Rev. E. B., Jordan Station .....Strawberries in solution.
Ontario Grape Growing and Wine Mfg. Co., St. Catharines..... Display of native wines.
Hamilton & Co., J. S., Brantford ..... " "
Girardot Wine Co., E., Sandwich ..... " "
Peart, Edwin, Burlington ... . " fruits.
Department of Agriculture, Toronto..... " bottled currants.
Woolverton, L., Grimsby ..... " " fruits.
Ontario Fruit Growers' Asssociation .....Literature.
Department of Agriculture .....Fruits in solution.

Wilder Bronze Medal.

Orr & Son, W. M., Fruitland .....Collection of fruits.

Honorable Mention.

Allen, W. J., Homer .....Display of raspberries and currants.
Armbrust, Wm. H., Pelham.....Collection of fruits and nuts.
Arnold, E., & Son, Queenston..... " fruits.
Anderson, Dr. H. L., Niagara ....Display of apples and pears.
Ashbaugh, C. D., Mohawk ..... " peaches.
Andrews, Rev. Wm., Beamsville..... " seedling apples.
Adams, E. E., Leamington .....Collection of fruits.

HONORABLE MENTION.—*Continued.*

Brown Bros., Fruitland	Display of grapes.
Brown, H. J., & Son, Niagara	" pears.
Bruner, John, Ruthven	" peaches.
Bruner, Thomas, Kingsville	Collection of fruits.
Bell, John, Audley	Display of apples.
Backus, M., Chatham	" Elberta peaches.
Black, Geo., St. David's	Collection of pears.
Bennett, G. H., Walkerville	" plums.
Biggar, G. C., Niagara Falls, South	" fruits.
Bromley, J. E., St. Catharines	Display of William's strawberries.
Bufton, C., Niagara	" pears and grapes.
Clement, John, Brantford	" quinces.
Campbell, Chas., Queenston	" grapes.
Coatsworth, G. M., Kingsville	" fruits.
Collins, H. E., St. Catharines	" "
Cameron. R., Niagara Falls, South	" lemons.
Carty, James. St. Catharines	" peaches.
Craize, Jas., Niagara	" Elberta peaches.
Dunn, L., St. Catharines	" fruits.
Ellis Bros., Stamford	" "
Ellis, Wm., St. David's	" "
Freeman, T. M., St. Catharines	Collection of strawberries.
Freeman, J. S., Freeman	Display of fruits.
Freshwater, A., Grimsby	" gooseberries.
Fisher, J. O., Virgil	" fruits.
Fisher, W. F. W., Burlington	" "
Fisher, Geo. E., Freeman	" "
Grobb, J. C., St. Catharines	" "
Ghent, T., Burlington	" apples and plums.
Griffis, A., St. Catharines	" fruits.
Havens, J., St. Catharines	" peanuts.
Haynes, A., St. Catharines	" grapes and pears.
Haynes, L., St. Catharines	" fruits
Hague, Jas., St. Catharines	" "
Hendershott, W. M., St. Davids	" peaches and plums.
Hunsberry, W. A., Jordan	" berries.
Hurd, H. H., Burlington	" pears and crab apples.
Hunter, Chas., Niagara	" fruits.
Hiscott, Major Jas., Virgil	" "
Jones, Harold, Maitland	" apples.
Johnson. Geo., St. David's	" blackberries and plums.
Kane, W. J., Niagara	" grapes.
Lampman, Joseph. St. Catharines	" "
Lawlor, B. A., Whitby	" pears.
McIntyre, E. J., Niagara	" fruits.
McCalla, W. C., St. Catharines	" peaches (St. John and Mt. Rose).
Mitchell, J. G., Clarksburg	" plums.
Myerscough, Thos., Caledonia	" strawberries.
Myles, Mrs A., St. Catharines	Exhibit of canned peaches in glass.
O'Malley, D., St. Catharines	Display of plums.
Parnall, S. E., St. Catharines	" apples.
Parnall, Jas., St. Catharines	" fruits.
Painter Richard, Jordan	" currants, raspberries and gooseberries.
Pritchard, J. J., Harriston	" apples.
Pattison, F. G. H., Grimsby	" apples and grapes.
Prest, Percival, Stamford	" grapes and pears.
Pendergast, John, & Son, St. David's	" fruits.
Pettit, A. H., Grimsby	" "
Pettit, A. C., Southend	" "
Pettit, C. C., Fruitland	" "
Pettit, C., Niagara Falls	" "
Ramsay, Allan, Niagara	" peaches.
Robertson, Geo. A., St. Catharines	" fruits.
Robinson, Jas., Niagara	" apples, pears and peaches.

HONORABLE MENTION.—*Concluded*

Springer, D. W., Pt. Nelson	Display of	plums and pears.
Slingerland, M., Niagara	"	apples.
Symington, James, Port Dover	Collection of	grapes.
Shepley, Isidore, Kingsville	Display of	apples,
Sandham, James, Queenston	"	peaches.
Stewart, Alex., St. Catharines	"	apples.
Smith, E. D., Winona	"	fruits.
Shearer, Sam., Niagara	"	"
Vrooman, W. H., Queenston	"	peaches.
Wilkins, O. F., Bridgeburg	"	fruits.
Woodruff, H. C., St. David's	"	"
Warner, W. A., Trenton	"	apples.
Watt, Dr. T. H., Niagara	"	fruits.
Wyld, Mr , Hamilton	"	pears.
White, C. E., St. Catharines	"	cherries and currants.
Caston, Geo. C., Craighurst	"	fruits in solution in glass.
Schenck, L. M., & Co., St. Catharines	"	canned fruits and vegetables.
Springbank Mineral Water Co., St. Catharines	"	mineral water.

STATES AND COUNTIES EXHIBITING IN HORTICULTURE.

LIST OF AWARDS OBTAINED.

	Gold Medal.	Silver.	Bronze.	Honorable Mention.	Total.
New York	44	49	103	175	371
Ontario	20	35	44	89	188
California (incomplete)	30	11	14	12	67
Oregon	18	22	51	22	113
Washington	12	16	19	7	54
Illinois	12	5	20	14	51
Michigan	9	6	25	23	63
Florida	7	5	5	..	17
Missouri	8	2	82	8	100
Wisconsin	4	4	15	11	34
Nebraska	3	2	2	2	9
Delaware	3	5	17	11	36
Connecticut	3	2	16	9	30
Idaho	3	2	10	11	26
Maine	2	1	12	3	18
Virginia	2	3	21	11	37
New Mexico	2	2	3	5	12
Nova Scotia	2	1	4	5	12
Ohio	2	..	1	1	4
Minnesota	1	1	6	8	16
New Jersey	1	1	12	7	21
Mexico	1	5	2	3	11
Arizona	1	1	1	2	5
Chili	1	1	1	1	4
Pennsylvania	..	1	..	1	2
Kansas	..	1	2	1	4
Quebec	..	..	1	..	1
New Hampshire	..	..	1	1	2
North Dakota	..	..	..	3	3
Iowa	..	..	1	..	1
Indiana	..	..	1	..	1
District of Columbia	..	..	..	1	1
Jamaica	..	1	..	..	1
Peru	..	..	1	..	1
Alabama	..	..	1	1	2
Georgia	..	..	1	3	4
Louisiana	..	..	2	..	2
Porto Rica	..	..	1	..	1
Tennessee	..	.	1	..	1
North Carolina	..	..	..	2	2
South Carolina	..	..	..	1	1
Total	191	185	499	454	1,329
Ontario	1-9	1-5	1-11	1-5	1-7

COMPARATIVE STATEMENT.

	Gold.	Silver.	Bronze.	Honourable Mention.	Total.
Illinois	12	5	20	14	51
Michigan	9	6	25	23	63
Missouri	8	2	82	8	100
	29	13	127	45	214
Ontario	20	35	44	89	188
Or comparing Ontario with the following :					
Florida	7	5	5	..	17
Delaware	3	5	17	11	36
New Jersey	1	1	12	7	21
Wisconsin	4	4	15	11	34
Nebraska	3	2	2	2	9
Idaho	3	2	10	11	26
	21	19	61	42	143
Ontario	20	35	44	89	188

COLLECTIVE EXHIBITS.

FRESH FRUITS.

E. E. Adams, Leamington. Exhibits made August 10.
Apples—Yellow Transparent.
Peaches—Alexander.
Awarded Honorable Mention.

E. P. Adams, Queenston. Exhibits made August 13, 17, 20, 27, September 5, 13.
Plums—Abundance, Burbank.
Peaches—Hynes Surprise, St. John, E. Crawford, Reeves' Favorite.
Awarded Bronze Medal.

W. J. Allen, Homer. Exhibits made July 8, 11, 30.
Raspberries—Marlboro'.
Currants—Black Naples.
Awarded Honorable Mention.

Dr. H. L. Anderson, Niagara. Exhibits made September 29th.
Apples—Fameuse.
Pears—Beurre Bosc.
Awarded Honorable Mention.

Rev. Wm. Andrews, Beamsville. Exhibit made June 5th.
Apples—Andrew's Seedling.
Awarded Honorable Mention.

Wm. H. Armburst, Chantler. Exhibits made October 7, 12.
Grapes—Brighton, Niagara, Concord.
Pears—Winter Bartlett.
Nuts—Hazel.
Awarded Honorable Mention.

Wm. Armstrong, Queenston. Exhibits made August 6, 15, 27, 30, Sept. 3, 7, 11, 17, 20.
Strawberries—Haverland.
Peaches—Waterloo, E. Crawford, Honest John, Elberta, Longhurst.
Grapes—Champion, Niagara, Salem, Wilder.
Quinces—Orange.
Plums—Green Gage, Niagara.
Awarded Silver Medal.

E. Arnold & Son, Queenston. Exhibits made August 30, September 17, 20.
Peaches—St. John.
Tomatoes—Not named.
Apples—Not named.
Grapes—Concords, Niagara, Brighton.
Awarded Honorable Mention.

C. D. Ashbaugh, Mohawk. Exhibits made September 2, October 1.
Tomatoes—Fanny Clyde.
Peaches—Crosby.
Awarded Honorable Mention.

P. Y. Babcock, Burlington. Exhibits made August 14, 16.
Blackberries—Snyder.
Plums—Abundance.

M. Backus, Chatham. Exhibit made September 18.
Peaches—Elberta.
Awarded Honorable Mention.

G. Bernard, Niagara. Exhibit made October 3.
Peaches—Globe.

Geo. C. Biggar, Niagara Falls South. Exhibits made June 20, 22, 26.
Strawberries—Bismark, Seaforth, Margaret, Marshall, Dominion, Clyde Glen Mary, Brandywine, Williams.
Awarded Honorable Mention.

Wm. Backhouse, St. Catharines. Exhibit made October 8.
Pears—Keiffer.

Alfred Ball, Niagara. Exhibit made October 15.
Apples—Russett,

Richard Ball, St. Catharines. Exhibit made August 20.
Peaches—Early Rivers.

John Bartlett. Oshawa. Exhibit made August 22.
Apples—Golden Sweet, Duchess, Early Harvest, Primate.
Awarded Bronze Medal.

Thomas Berriman, Stamford. Exhibit made September 28.
Grapes—Concord.

Thomas Beattie, St. Catharines. Exhibits made June 17, 22, 24, July 8, 23, 30, August 5, 19, 29, September 4, 19.
Strawberries—Clyde.
Roses—In Variety.
Gooseberries—White Smith, Industry.
Peaches—Sneed, Triumph, St. John, Crosbey.
Plums—Burbank.
Grapes—Niagara, Brighton.
Awarded Silver Medal.

G. H. Bennett, Walkerville. Exhibits made September 5, 7, 9.
Plums—Burbank, Hudson River, Purple Egg, Yellow Japan.
Awarded Honorable Mention.

William Bennett, St, David's. Exhibit made August 6.
Pears—Lawson.

John Bell, Audley. Exhibit made October 3.
Apples—King, Baldwin, Greening, Wagner, Rolf, Ben Davis, N. Spy, Crab.
Awarded Honorable Mention.

Geo. C. Biggar, Brantford. Exhibit made August 26.
Apples—Duchess.

Geo. Black, St. David's. Exhibits made August 20, 30.
Pears—Clapp's Favorite, Bartlett.
Awarded Honorable Mention.

Geo. I. Bolster, Orillia. Exhibit made October 11.
Apples—McIntosh Red, Pewaukee, Baldwin, Wealthy.
Pears—Seckel.

A Borrowman, St. Catharines. Exhibit made October 15.
Quinces.

H. C. Bradley, Queenston. Exhibits made August 13, 27, September 5, 20, 21.
Peaches—Triumph, St. John, Yellow Alberg, Champion, Reeve's Favorite, Elberta, Crosbey, L. Crawford, Longhurst, Old Mixon.
Plums—Niagara, Gueii, Green Gage, Red Egg.
Pears—Bartlett, Clapp's Favorite, Duchess, Louise Bonne, Clairgeau.
Awarded Bronze Medal.

Moses Brady, Thorold. Exhibits made October 3.
Grapes—Niagara, Concord, Jessica.

Richard Brecken, Dundas Street, Toronto. Exhibit made October 18.
Apples—Spitzenberg, Hubbardson, Seedling.

J. F. Brennan & Son, Grimsby. Exhibits made August 7, September 11, 13, 25, 27, October 1, 4.

Peaches, Ashland Brand—Alexander, Early Crawford, Late Crawford, Elberta, Chair's Choice.
Awarded Gold Medal.

J. H. Broderick, St. Catharines Exhibit made September 16,
Peaches—Pratt, Carlisle, Elberta.
Grapes—Wyoming Red.

J. E. Bromley, St. Catharines. Exhibit made June 21.
Strawberries—Williams.
Awarded Honorable Mention.

H. J. Brown & Son, Niagara. Exhibits made September 7, October 2.
Pears—Beurre Bosc, Bartlett, Sheldon, Beurre d'Anjou, Seedling.
Peaches—Contennial.
Awarded Honorable Mention.

Brown Bros, Fruitland. Exhibit made October 23.
Grapes—Iona, Diana, Catawba, Niagara.
Awarded Honorable Mention.

Thos. Bruner, Kingsville. Exhibit made September 25.
Peaches—Duke of York, Elberta.
Awarded Honorable Mention.

John Bruner, Ruthven. Exhibit made August 16.
Peaches—Triumph.
Awarded Honorable Mention.

Neil Buchanan, St. Catharines. Exhibit made August 5.
Peaches—Sneed.

C. Bufton, Niagara. Exhibit made September 27.
Pears—Sheldon, Beurre Bosc.
Grapes—Rogers 19, Concord.
Awarded Honorable Mention.

C. T. Bunting, St Catharines. Exhibit made August 13.
Apples—Red Astrakhan.

Gordon Bunting, St. Catharines. Exhibits made June 20, 24, July 16, 23, 30, August 5, 13, 27, September 2, 9, 18, October 12.
Strawberries—Johnson's Early, Clyde, Crescent, Seaford, Glen Mary, Excelsior, New York, Duff, Gladstone, Greenville, Rio, Williams, Darling, Wm. Belt, Not Named.
Raspberries—Gregg, Marlboro, Turner.
Currants—Lee's Prolific.
Plums—Ogon, Burbank, Bradshaw.
Peaches—Alexander, Early Canada, St. John, Early Crawford, Reeves' Favorite.
Apples—Astrakhan
Grapes—Niagara, Concord.
Awarded Silver Medal.

Burlington Horticultural Society. Collective exhibits made July 26, August 9, 14, 16, 20, 21, 23, 28, 30, September 6, 11, 21, 25, 28, by the following individuals, details of whose exhibits may be found under their respective names.

P. Y. Babcock, J. S. Freeman, David Jardine, R, Collen, T. E. Ghent, David Kerns, Mrs. T. Dalton, Thos. Graham, J. Lindley, C. N. Dynes, Arthur Grey, Mrs. McCulloch, Herbert Dynes, W. V. Hopkins, Vernon R. Peer, Stanley Dynes, H. H. Hurd, A. W. Peart, Geo. E. Fisher, Chas. Ireland, Geo. N. Peer, E. Peart, David Fillman, Geo. Ireland, Thomas Peart, W. F. W. Fisher, John Ireland, Thomas Foster, Jonathan Ireland, W. E. A. Peer, Andrew Pettit, Thomas Ireland, C. C. Pettit, Hugo Pettit, Thomas Dalton, David Sinclair; James Sinclair, D. W. Springer, O. T. Springer, E. Thorpe.
Awarded Silver Medal.

J. H. Burns, Niagara. Exhibits made September 26, 27.
Peaches—Late Crawford.
Quinces—Cut Flowers—Fancy Coxcomb.

John Burrows, Burtch. Exhibit made August 26.
Pears—Clapp's Favorite.

R. Cameron, Niagara Falls. Exhibits made September 3, 10, 12, 25, 30, October 8, 12, 16, 25.
Assorted Cut Flowers, and Decorative Plants and out-door grown Lemons.
Awarded Bronze Medal.
Awarded Honorable Mention.

Charles Campbell, Queenston. Exhibits made September 20, 24.
Grapes—Rogers No. 22, Concord, Niagara, Worden.
Awarded Honorable Mention.

W. J. Campbell, Niagara. Exhibit made October 4th.
Pears—Beurre Bosc.
Peaches—Smock.

Jas. Carty, St. Catharines. Exhibits made Sept. 12, 18, October 3.
Peaches—Early Crawford, Late Crawford, Globe.
Awarded Honorable Mention.

J. E. Chute, Lakeview. Exhibit made May 22.
Apples—Rox Russetts.

Dominion Central Experimental Farm, Ottawa. Exhibit made October 11.
Apples—Wealthy, Wolf River, Shiawassa Beauty, Repka, Malenka, Melinda, Fameuse, Antonovka, Patten's Greening, Haas, Salome, Lawver, Edgehill, La Victoire, American Golden Russett, North Star, Missouri Pippin, Princess Louise, Gideon, MacMahon's White, McIntosh Red, Scott's Winter, Duke of Connaught, Cross, Milwaukee.
Awarded Silver Medal.

W. H. Chaplin, Newcastle. Exhibits made October 8, 18.
Apples—Gano, Baldwin, Mammoth Black Twig, Canada Red, N. Spy, Golden Russett, Ben Davis, Spitzenberg.
Awarded Bronze Medal.

A. D. Chisholm, Oakville. Exhibit made September 14.
Apples—Wealthy.

John C. Clement, Brantford. Exhibit made October 4.
Quinces—Pear.
Awarded Honorable Mention.

G. M. Coatsworth, Kingsville. Exhibits made August 21, 22.
Apples—Golden Sweet, Primate.
Plums - Abundance.
Peaches—Early Rivers.
Awarded Honorable Mention.

J. P. Cockburn, Gravenhurst. Exhibits made August 30, September 16.
Apples—Russel, Alexander, Unnamed.
Awarded Bronze Medal.

David Cole, Southend. Exhibit made September 5.
Peaches—Mountain Rose, Fitzgerald.

Evelyn Collins, St. Catharines. Exhibit made July 8.
Bouquets—Sweet Peas.

H. E. Collins, St. Catharines. Exhibits made August 5, 29, September 10, 23.
Apples—Astrakhan.
Pears—Clapp's Favorite, Beurre Clairgeau.
Plums—Ogon.
Grapes—Brighton, Empire State, Concord.
Awarded Honorable Mention.

S. & W. H. Collinson, St. Davids. Exhibits made August 6, 9, 13, 17, 27, September 5, 10, 13, 20, 26, Oct. 2.
Pears- Lawson.
Peaches—Alexander, Early Rivers, Hynes' Surprise, Mountain Rose, Fitzgerald, Garfield, Reeve's Favorite, Elberta, Wager, Early Crawford, Coolridge's Favorite, Belle of Georgia, Old Mixon, Globe, Late Crawford, Crosbey, Longhurst, Steven's Rareripe, Smock, Chair's Choice.
Awarded Silver Medal.

John Cooper, Niagara. Exhibit made October 2.
Pears—Sheldon, Keefer, Mt. Vernon.

Chas. Corley, Port Dalhousie. Exhibit made July 16.
Cherries—Seedling.

R. Cotter, Port Nelson. Exhibit made August 16.
Apples—Maiden's Blush, Duchess.

D. Cotton, Orillia. Exhibit made October 11.
Apples—Quebec Winter Sweet.

James Craise, Niagara. Exhibit made September 27.
Peaches—Elberta.
Awarded Honorable Mention.

W. T. Crouch, Virgil. Exhibit made June 5.
Apples—Golden Russetts.

S. M. Culp, Beamsville. Exhibits made June 20, July 11, August 31, October 9.
Strawberries—Clyde.
Currants—Fay's Prolific.
Gooseberries—White Smith.
Pears—Bartlett, Clapps Favorite, Duchess.
Plums—Coe's Golden Drop, Washington.
Awarded Bronze Medal.

R. Currie, Niagara. Exhibits made September 17, 21, 27, October 10, 17.
Peaches—Hill's Chili, Crosbey, Elberta, Jacques' Rareripe, Longhurst, Honest John, Old Mixon, Smock.
Pears—Duchess, Lawrence, Seckel, Langelier, Pound, Keiffer, Vicar of Wakefield, D'Anjou, Bosc.
Grapes—Niagara, Vergennes.
Apples—Golden Russett.
Nuts—Almond.
Awarded Bronze Medal.

Mrs. T. Dalton, Freeman. Exhibits made August 28, September 21.
Apples—Transcendent Crab.
Peaches—Early Rivers.
Plums—Ireland's Seedling.
Pears—Clairgeau.

Harry Dempsey, Rednersville. Exhibits made October 9, 21.
Apples—Arctic, Baldwin, Ben Davis, Bottle Greening, Black Detroit, Belleflower, Cranberry Pippin, Fallawater, Fameuse, Flushing Spitz, Grime's Golden, Gano, Golden Russett, King, McMahon's White, McIntosh Red, Missouri Pippin, North Star, R. I. Greening, Rox Russett, Stark, Swayze Pomme Gris, Scarlet Pippin, St. Lawrence, Tolman Sweet, Wealthy, Wolfe River.
Awarded Silver Medal.

R. H. Dewar, Fruitland. Exhibits made October 5, 9.
Peaches—Late Crawford.
Grapes—Brighton.

Stanley Dynes, Freeman. Exhibit made September 11.
Plums—Yellow Egg.
Pears—Goodale, Bartlett.
Grapes—Moore's Early.

W. H. Dempsey, Trenton. Exhibits made August 14, 29, September 13, 30, October 12.
Apples—Alexander, Acker, Astrakhan, Antonovka, Arabka, Becker's Red, Bush Sweet, Blunt, Bismark, Barcelona, Pearmain, Baxter, Baldwin, Bailey Sweet, Beauty of Kent, Coe's River Beauty, Cooper's Market, Duchess, Early Harvest, Eicke, Fameuse, Fanny, Fallawater, Gravenstein, Golden Gem, Gibson, Gravel Pippin, Grand Sultan, Golden Sweet, Golden Russett, Holland, Hawthornden, Hamilton, Horn, Isham, Isabella, Ingram, Kentish Fill-basket, Mann, Mann Pippin, Magog Red Streak, McLean, Munson's Sweet, Mountain Best, Maggie's Favourite, Milding, Northern Spy, Norcaster Spy, Northfield Beauty, Ontario, Old Pearmain, Primate, Palouse, Pioneer, Parlin, Plumb's Cider, Rox. Russett, Rochelle, St. Lawrence, Saxon, Starr, Spitzenburg, Switzer, Sops of Wine, Seek-no-farther, Scott's Winter, Scarlet Pippin, Trenton, Twenty Ounce Pippin, Van Morriss' Reinette, Wealthy, Washington, Strawberry, Wagner, Windsor Chief, Wharton, Winter Banana, Yellow Transparent.
Awarded Gold Medal.

Joseph Dunn, St. David's. Exhibit made September 3, 24, 28, October 8, 11, 13, 22.
Apples—Cranberry, Gloria Mundi, Fall Pippin, Baldwin, Northern Spy, Fameuse, Swazye Pomme Gris, Greening, Spitzenburg, Swaar.
Blackberries—Lawton.
Nuts—Chestnuts, Butternuts, Walnuts, Hickorynuts.
Peppers—Ruby King.
Peaches—Fitzgerald, Mountain Rose, Elberta, Longhurst, Late Crawford, McLide, Globe, Crosbey, Smock, Seedling.
Pears—Duchess, Beaurre Clairgeau.
Plums—Yellow Egg, Yellow Japan, Lombard.
Grapes—Delaware, Niagara.
Boquets—Dahlias.
Tomatoes—Ponderosa, New Stone.
Awarded Bronze Medal.

A. E. Dudinhoffer, Orillia, Exhibits made October 11.
Apples—Fameuse.

Luther Dunn, St. Catharines. Exhibits made June 18, October 16.
Strawberry plants—24 varieties.
Tropical Fruits—Cerriman or Monstera Deliciosa.
Awarded Honorable Mention.

C. N. Dynes, Freeman. Exhibits made August 14, 28, September 11, 25, 28.
Apples—Yellow Transparent.
Gooseberries—Industry.
Plums—Saunders, Burbank, Reine Claude.
Pears—Boussock.
Peaches—Alexander, Crosbey.
Grapes—Moore's Early, Wyoming Red, Niagara, Concord, Lindley, Agawam, Moyer.

Herbert Dynes, Burlington. Exhibits made September 11, October 14.
Apples—Wealthy.
Plums—Niagara, Lombard, Monarch.
Peaches—Mountain Rose, Tyhurst, Early Crawford.
Pears—Bartletts, Goodale.
Grapes—Wilder, Niagara, Lindley, Concord, Moyer.

Miss M. Douglas, St. Catharines. Display of Sweet Peas and Cut Flowers.

Ellis Bros., Stamford. Exhibit made September 10.
Peaches—Early Crawford, Reeve's Favourite.
Plums—Kingston, Pond's Seedling.
Awarded Honorable Mention.

G. E. Emmett, Sparta. Exhibit made May 22.
Apples—Golden Russetts.

Will Ellis, St. Davids. Exhibits made October 11, 15.
Pears—Keiffer, Bosc, Vicar of Wakefield, Idaho.
Peaches—Smock, Solway.
Grapes—Niagara, Lindley.
Awarded Honorable Mention.

Henry Emerick, Bridgeburg. Exhibits made September 13, 16.
Peaches—Champion, Elberta.

Robert Fallis, Harriston. Exhibit made September 30.
Apples—N. Spy, Fallawater, Greening, King, Golden Russett, Belleflower, Fameuse.
Awarded Bronze Medal.

T. H. Farmer, Port Dalhousie. Exhibit made October 7.
Display of Dahlias.
Awarded Honorable Mention.

J. J. Fee, St. Catharines. Exhibit made July 30.
Blackberries—Lawton.

James Furminger, St. Catharines. Exhibits made August 2, 6.
Currants—Fay's Prolific.
Apples—Astrakhan.

J. O. Fisher, Virgil. Exhibits made October 3.
Peaches—Late Crawford, Crosbey, Late White.
Grapes—Delaware, Cottage, Wyoming Red, Roger 19, Esther, Black Delaware.
Pears—Seed ing, Goodale, Sheldon, Keiffer.
Quinces—Orange.
Apples—Northern Spy, Pomme Gris, Greening, Fameuse, Sweet, Mann, Rox. Russett, King, Baldwin.
Awarded Honorable Mention.

W. F. W. Fisher, Burlington. Exhibits made August 9, 14, 16, 23, 30, September 6, 11, 21, 28.
Apples—Primate, Duchess, Wealthy, Ribston Pippin, Wagner.
Pears—Clapp's Favorite, Bartlett, Boussock, Duchess, Goodale, Lawton, Sheldon.
Plums—Niagara, Abundance, Burbank, Pond's Seedling, Glass Seeding, Yellow Egg, Duane's Purple, Lombard.
Peaches—Alexander, E. Rivers.
Mulberries—White Russian, Pink Russian.
Grapes—Moore's Early, Niagara, Brighton, Delaware.
Nuts—Walnuts.
Awarded Honorable Mention.

S. D. Furminger, St. Catharines. Exhibit made June 20, August 16.
Apples—Astrakhan.
Strawberries—Glen Mary.

David Fillmar, Burlington. Exhibits made August 16, 21.
Plums—Abundance, Ireland's Seedling.
Peaches—Early Rivers.

C. E. Fisher & Son, Queenston. Exhibits made August 23, 27, 28, 30, September 3, 7, 10, 17, 20.
Plums—Niagara, Burbank, Shipper's Pride, Washington.
Peaches—E. Rivers, St. John, E. Crawford, Honest John, Jacques' Rareripe, Coolridges Favorite, Late Crawford, Elberta, Crosby.
Awarded Bronze Medal

George E. Fisher, Freeman. Exhibit made August 14, 23, 28, 30, September 6, October 3.
Currants—Black Champion, Lee's Prolific.
Apples—Duchess.
Plums—Ireland's Seedling, Burbank, Abundance, Bradshaw, Niagara, Washington, Yellow Egg, Gueii.
Pears—Bartlett, Boussock, Duchess, Keiffer.
Awarded Honorable Mention.

J. C. Flower, St. Catharines. Exhibits made August 20, September 4.
Plums—Burbank.
Peaches—Early Crawford.

Thos. Foster, Burlington. Exhibits made August 21, 30, September 21, 25.
Plums—Ireland's Seedling, Niagara.
Pears—Boussock, Duchess.
Peaches—Early Rivers.
Apples—Northern Spy.

Francis, The Florist, Oshawa. Exhibit made August 29.
Cut Flowers, Dahlias, Gladiolus.

W. S. Fraser, Bradford. Exhibit made October 4.
Apples—Seedling, Red Flesh.

Freel Bros., Niagara. Exhibits made September 4, 11, 13, 20, 27, October 12.
Peaches—St. John, E. Crawford, Foster, Alberg, Great Northern, Crosby, Old Mixon, Longhurst, Barnard, Elberta, Lord Palmerston, Globe, M'Lide Chidling, Reeve's Favorite, L. Crawford, Fitzgerald, Chair's Choice, Solway, Centennial, Wonderful.
Pears—Louise Bonne de Jersey.
Apples—Fameuse, Rox. Russett.
Awarded Silver Medal.

J. S. Freeman, Freeman. Exhibits made August 16, 21, 20, September 11, October 3.
Pears—Giffard, Boussock, Duchess, Bartlett.
Plums—Niagara, Burbank.
Apples—Yellow Transparent, Trancendent Crab.
Awarded Honorable Mention.

Amos Freshwater, Grimsby. Exhibit made August 8.
Gooseberries—White Smith, Crown Bob.
Awarded Honorable Mention.

M. Field, Virgil. Exhibit made October 3.
Peaches—Chairs' Choice.

T. M. Freeman, St. Catharines. Exhibit made June 18.
Strawberries—Marshall, Clyde, New York, Nick Omer, Glen Mary, Ruby, Splendid, Sample.
Awarded Honorable Mention.

John Gallagher, St. Catharines. Exhibit made August 12.
Peaches—Early Rivers.

T. Ghent, Burlington. Exhibits made August 9, 30.
Plums—Niagara, Lombard.
Peaches—Early Rivers.
Apples—Sweet Bough.
Awarded Honorable Mention.

W. H. Gibson, Newcastle. Exhibit made October 8.
Apples—Ontario, Spy, Ben Davis.

F. A. Goring, Homer. Exhibit made August 26.
Grapes—Moyer, Champion, Jessica.

Thomas Graham, Burlington. Exhibit made August 14.
Gooseberries—Industry.

R. J. Graham, Belleville. Exhibits made September 18, 23, 24, 28, October 4, 9, 17.
Apples—Autumn Strawberry, Fameuse, Haas, Maiden's Blush, Colvert, Not Named, Boiken, St. Lawrence, Golden Russet, Lowell, Fall Orange, Wealthy, Hawley, 20 Ounce, Ribston, Blenheim, Ben Davis, Strawberry, Stark, Tolman Sweet, Pennock, Seek-no-Farther, Mann, Baldwin, McIntosh Red.
Awarded Silver Medal.

Arthur Grey, Pt. Nelson. Exhibit made August 14.
Gooseberries—Industry.

Alfred Griffis, St. Catharines Exhibits made June 17, 18, 21, 24, August 6, 9, 16, 26, September 20, 30, October 2, 18.
Strawberries—Williams, Michel, Clyde, New York, Williams.
Peaches Alexander, E. Rivers, Elberta, Late Crawford, Steven's Rareripe.
Plums—Ogon, Burbank, Abundance.
Grapes—Concord, Niagara, Salem, Delaware, Creveling, Brighton, Diamond, Rogers 9.
Pears—Keiffer.
Awarded Silver Medal.
Awarded Honorable Mention.

J. C. Grobb, St. Catharines. Exhibits made July 24, 25, August 30, September 5, 14.
Apricot—Russian.
Plums—Orange, Green Gage, Yellow Gage, Pond's Seedling.
Peaches—Early Crawford.
Awarded Honorable Mention.

T. C. Hagaman, Oakville. Exhibits made July 6, September 14.
Strawberries—Not named.
Apples—Wealthy.
Awarded Bronze Medal.

James Hague, St. Catharines. Exhibits made August 19, September 2, 20.
Peaches—Early Rivers, Triumph, Early Michigan, Early Crawford, Late Crawford, Old Mixon, Not Named.
Plums—Paragon, Shiro.
Pears—Brockworth Park.
Awarded Honorable Mention.

J. E. Hambley, Cedar Springs. Exhibits made August 8, 16, 21, September 6, 13, 25, 28, October 16, 23.
Peaches—Alexander, Amsden's June, Waterloo, Zulu, Triumph, Early Rivers, Early Crawford, Barnard, Champion, Elberta, Hill's Chili.
Apples—Mann, Wagener, Hubbardston, Ben Davis, Pearmain, Tompkin's King, Twenty Ounce, Stark, Belleflower, Quince.
Awarded Bronze Medal.

Joseph Hanniwell, St. Davids. Exhibit made October 8.
Peaches—Smock.

Andrew Haynes, St. Catharines. Exhibits made September 2, 14, 23.
Grapes—Niagara, Moore's Early, Rogers 22, Worden, Wyoming Red, Agawam, Delaware, Lindley.
Pears—Clapp's Favorite.
Awarded Honorable Mention.

Lewis Haynes, St Catharines. Exhibits made September 14, 30.
Grapes—Delaware, Concord, Brighton.
Peaches—Late Crawford, Chair's Choice.
Awarded Honorable Mention.

C. S. Harvie, Orillia. Exhibits made October 11th.
Apples—Wolf River, McIntosh Red, Alexander.

J. Havens, St. Catharines. Exhibit made October 10th.
Peanuts.
Awarded Honorable Mention.

W. M. Hendershot, St. Davids. Exhibits made August 17, September 3, 17, October 8.
Plums—Abundance, Gueii.
Peaches—Hynes, Surprise, Early Rivers, Reeve's Favourite, Champion, Mountain Rose, Early Crawford, White Seedling.
Awarded Honorable Mention.

W. W. Hilborn, Leamington. Exhibits made July 17, August 10, 16, 29, September 18, 25.
Cherries—Windsor, Montmorency.

Currants—Cherry.
Raspberries—Cuthbert.
Plums—Willard, Red June, Ford's Early, Abundance, Chabot, Satsuma, Berkmans, Wickson.
Peaches—Greensboro', Red Rivers, Early Rivers, Saint John, Mrs. Brett, Tyhurst, Crosby, Jacques' Rareripe, Late Crawford, Bronson, Pearce's Yellow, Nanaper, Mary's Choice, Stevens, Elberta, Kalamazoo, Oscar's Black Prince.
Pears—Wilder.
Awarded Bronze Medal.

Thomas Hiscott, Niagara. Exhibit made September 27th.
Grapes—Niagara.
Apples—Snow.

James Hiscott, Virgil. Exhibits made September 11, 15, 27.
Pears—Bartlett, Keiffer, Sheldon.
Peaches—Globe, Late Crawford, Old Mixon, Wheatland, Elberta.
Grapes—Concord, Pocklington, Niagara.
Awarded Honorable Mention.

W. V. Hopkins, Burlington. Exhibits made August 14, 16, 21, 23, 28, September, 6, 11, 25, October 3.
Pears—Lawson, Bartlett, Goodale, Clapp's Favourite.
Apples—Duchess, Yellow Transparent, Late Bough, Fameuse.
Peaches—Alexander, Early Rivers, Mountain Rose, Barnard, Hill's Chili, Elberta, Crosby, Old Mixon.
Plums—Burbank, Washington, Lombards, Niagara, Pond's Seedling, Common Blue.
Awarded Bronze Medal.

George Horning, Waterdown. Exhibit made October 3rd.
Apples—Fameuse, Spy, Swaar, Ribston, Pippin, Mann, Seek-no-farther.
Pears—Bourre d' Anjou.
Awarded Bronze Medal.

Mrs. Houston, St. Catharines. Exhibits made August 19, 20.
Apples—Astrakhan, Duchess.

W. House, Bridgeburg. Exhibit made September 25th.
Peaches—Old Mixon, Waterloo, Elberta.

R. L. Huggard, Whitby. Exhibits made August 22, 29, October 3, 16, 21.
Apples—Duchess, Transparent, Astrakhan, Early Harvest, Kentish Fillbasket, Pippin, Salome, Ben Davis, Baldwin, Greening, Wealthy, Swaar, Pennock, Fameuse, Golden Russett, Twenty Ounce, Western Beauty, Spy, Boston Star, Ribston, Tompkin's King, Minkler, Canada Red, not named.
Pears—Clapp's Favourite, Rostiezer, Belle Lucrative, Sheldon, Mount Vernon, Goodale, Idaho, Giant Morceau, Buerre d' Anjou, Le Conte, Keiffer, Souvenir, Winter Nelis, Lawrence, Buffum, Gen. Druard, Japan Golden Russett, Clairgeau, Abbe de Paris, Duchess.
Plums—Magnum Bonum, Burbank, Diamond, Imperial Blue, Abundance, Washington, Prince of Wales, Gen. Hand, Montreal Beauty, Gueii.
Awarded Silver Medal.

W. A. Hunsberry, Jordan. Exhibit made July 16.
Raspberries—Marlboro'.
Currants—Fay.
Awarded Honorable Mention.

C. M. Honsberger, Jordan Station. Exhibits made June 18, July 16, August 28.
Strawberries—Clyde, Glen Mary, Michel.
Currants—Fay.
Peaches—St. John.
Grapes—Moore's Early, Moyer.
Awarded Bronze Medal.

Chas. Hunter, Niagara. Exhibits made September 12, 13.
Plums—Shippers' Pride, Green Gage, Imperial Gage.
Peaches—Early Crawford, Reeve's Favorite.
Pears—Bartlett.
Grapes—Merrimack, Niagara.
Awarded Honorable Mention.

H. H. Hurd, Burlington. Exhibits made October 2.
Pears—Clairgeau, Seckel, Keiffer.
Apples—Crab.
Awarded Honorable Mention.

Miss M. Hutt, Stamford. Exhibit made July 29th.
Gooseberries—Industry, Pearl, Houghton, White Smith, Downing.

A. G. Hull & Son, St. Catharines. Display of cut flowers.

Charles Ireland, Port Nelson. Exhibit made August 30.
Plums—Common Blue, Ireland's Seedling.

George Ireland, Port Nelson. Exhibit made August 30.
Plums—Ireland's Seedling.
Pears—Tyson.

John Ireland, Port Nelson. Exhibits made August 9, 14, 21, 30, September 11, 21, 25, 28 October 3.
Plums—Washington, Gueii, Lombard, Ireland's Seedling, Normands, Sugar, Staunton.
Gooseberries—Industry.
Apricots—
Peaches—Alexander.
Apples—Ribston Pippin, Duchess.
Pears—Clapp's Favorite, Duchess.
Grapes—Lindley, Niagara, Concord.
Quinces—

Jonathan Ireland, Port Nelson. Exhibit made October 14th.
Pears—Keiffer, Clairgeau, Beurre d' Anjou, White, Doyenne.
Apples—Fameuse, Blenheim, Pippin, Golden Russet.

Thomas Ireland, Port Nelson. Exhibits made August 16, October 14.
Plums—Ireland's Seedling, Imperial Gage, Yellow Gage, Swiss.
Apples—Greening, Baldwin, Golden Russet.
Pears—Beurre de Anjou.

W. K. Jackson, Niagara—Exhibits made September 12, 21, 27, October 4, 8.
Peaches—Hans Golden.
Pears—Flemish Beauty, Bartlett, Louise Bonne, Beurre d' Anjou, Duchess, Beurre Bosc.
Apples—Bottle Greening, Golden Russet, Crab, Northern Spy, Swayzie's Pomme Gris, Phœnix, R I. Greenings.
Grapes—Prentiss, Vergennes, Catawba.
Walnuts—English.
Awarded Bronze Medal.

D. Jardine, Port Nelson. Exhibits made August 21, 28, September 25, 28.
Plums—Marianna, Burbank, Prunus Simonii, Shipper's Pride, Yellow Egg, Niagara, Gueii, General Hand.
Grapes—Concord, Niagara.
Apples—Transcendent Crab.

Harold Jones, Maitland. Exhibit made October 4th.
Apples—Scarlet, Pippin, Fameuse.
Awarded Honorable Mention.

George Johnson, St. David's Exhibit made Aug. 9.
Plums—Abundance.
Blackberries—Lawton.

Mrs. Helen Joy, Orillia. Exhibit made October 11.
Apples—Red Russet.

Ralph Kalar, Niagara Falls South. Exhibit made October 3.
Grapes—Concord.

W. J. Kane, Niagara. Exhibit made September 21.
Grapes—Niagara.
Awarded Honorable Mention.

David Kerns, Freeeman. Exhibit made September 25, 28.
Apples—Transcendent Crab, Northern Spy.
Grapes—Agawam.
Pears—Clairgeau.

E. Kennedy, Jordan. Exhibit made July 16.
Raspberries—Marlboro'.

Wesley Kerns, Freeman. Exhibits made September 25, 28.
Grapes—Niagara, Agawam.
Apples—Transcendent Crab, Golden Russett, Northern Spy.

F. H. Kivell, Bridgeburg. Exhibit made September 10.
Grapes—Duchess, Delaware, Niagara.
Awarded Bronze Medal.

Mrs. H. Kottmier, St. Catharines. Exhibit made July 8.
Flowers—Sweet Peas.

Joseph Lampman, St. Catharines. Exhibits made September 11, October 21.
Grapes—Delaware, Roger 4, Roger 22, Niagara, Moore's Diamond.
Awarded Honorable Mention.

J. D. Larkin, Queenston. Exhibit made September 24.
Peaches—Globe.

R. A. Lehmann, Orillia. Exhibit made October 11.
Apples—Fallawater.
Pears—Flemish Beauty.

B. A. Lawlor, Whitby. Exhibit made October 3.
Pears—Louise Bonne de Jersey.
Awarded Honorable Mention.

Alex. Lawson, St. Davids. Exhibit made August 22.
Grapes—Moore's Early.

George Law, Niagara Falls South. Exhibits made June 20, 22, 26, July 6, 20, August 29, October 3, 11.
Strawberries—Marshall, Clyde, Excelsior, Brandywine, Williams.
Gooseberries—Golden Prolific, Industry, Smith's Improved, Downing.
Raspberries—Marlboro, Gregg, Golden Queen.
Currants—Fay's Prolific, Moore's Ruby, Raby Castle, White Grape.
Plums—Washington, Niagara.
Pears—Clairgeau, Keiffer, D'Anjou.
Awarded Bronze Medal.

J. A. Leckie, Clarkson. Exhibit made October 17.
Apples—Stark, Northern Spy, Ribston, Fallawater, Rox. Russet, Tolman Sweet, Phoenix, Swazie. Belleflower, Spitzenburg, Fameuse, Baldwin, Melinda, Fall Pippin. Golden Russet, Belle Russet, Mann, Greening.
Pears—Sheldon, Beurre d' Anjou, Keiffer.
Awarded Bronze Medal.

A. A. Leslie, Aylmer. Exhibits made June 22, September 2, 24.
Strawberries—Clyde, Woolverton.
Plums—Washington.
Apples—Baldwin, Wagner, N. Spy, Pound, Gideon, Wealthy.

J. Lindley, Freeman. Exhibit made August 30.
Plums—Niagara.
Peaches—Early Rivers.

S. Lobb, Virgil. Exhibit made August 27.
Peaches—Yellow St. John.

Charles Lyons, Queenston. Exhibits made September 5, 20.
Plums—Lombard, Satsuma, German Prune, Yellow Egg, Niagara.

Mrs. M. Mills, Sparta. Exhibit made May 22.
Apples—Newtown Pippin.

Charles Lowrey, Queenston. Exhibits made August 6, 20, 30, September 7, 10, 17, 26.
Plums—Ogon, Abundance, Burbank, Niagara, Lowrey's Gage, Imperial Gage, Moyer, Gueii, Quackenbos, Satsuma, Lombard, German Prune, Reine Claude.
Peaches—Triumph, St. John, Mountain Rose, Early Crawford, Reeve's Favourite, Longhurst.
Pears—Howell, Sheldon, Duchess, Seckel, Clairgeau.
Grapes—Vergennes, Delaware, Concord, Niagara.
Awarded Bronze Medal.

L. Leverton, Sparta. Exhibit made May 22.
Apples—Cooper's Market.

F. A. Medcraft, Sparta. Exhibit made May 22.
Apples—Ben Davis.

Charles McGowan, Brighton. Exhibit made June 18.
Apples—Northern Spy.

Robert Malcom, Orillia. Exhibit made October 11.
Pears—Idaho.

A. Martin, Consecon. Exhibit made October 14.
Apples—Haas.

O. E. May, Port Dalhousie. Exhibit made July 16.
Cherries—Black Heart, Governor Wood.

Joseph May, Queenston. Exhibit made August 17.
Plums—Wray's Seedling.

W. C. McCalla St. Catharines. Exhibit made September 3.
Peaches—St. John, Mountain Rose.
Awarded Honorable Mention.

Frank McHugh, St. Catharines. Exhibit made September 10.
Peaches—Early Crawford.

Mr. McCulloch, Port Nelson. Exhibit made October 2.
Apples—Fameuse, Canada Red, Mann, Golden Russet, Baldwin.

J. Macgregor, Whitby. Exhibit made October 3.
Apples—Fameuse, Pewaukee, Tolman, Stark, Ben Davis, Ribston, Golden Russet, Seek-no-farther, Baldwin, King, Kentish Fillbasket, Belleflower, Fall Pippin, R. I. Greening.
Awarded Bronze Medal.

T. McIntee, St. Catharines. Exhibit made August 5.
Pears—Early Harvest.

E. J. McIntyre, Niagara. Exhibits made September 2, 12, 19, October 2.
Peaches—Elberta, Yellow St. John, Old Mixon, Longhurst, Crosby, Smock.
Pears—Keiffer, Swan's Orange.
Grapes—Niagara.
Awarded Honorable Mention.

J. McLaren, St. Catharines. Exhibit made September 27.
Pears—Beurre Bosc.
Awarded Bronze Medal.

W. N. McLeod, Stamford. Exhibit made September 28.
Grapes—Brighton, Delaware, Niagara, Concord.

T. R. Merritt, St. Catharines. Exhibits made July 8, 30, September 11, 20, October 4.
Currants—Fay's Prolific.
Gooseberries—Whitesmith, Loudon, Industry, Crown Bob, Golden Ball, Wellington.
Grapes—Black Hamburg, Golden Chasselis, Concord, Grisley Frontenac, Brighton, Niagara, Delaware, Vergennes, Wilder.
Awarded Silver Medal.

Thos. Myerscough, Caledonia. Exhibit made June 30.
Strawberries—Williams.
Awarded Honorable Mention.

Mrs. A. W. Myles, St. Catharines. Exhibit made July 8.
Canned Peaches.
Awarded Honorable Mention.

C. S. Miller, Kingsville. Exhibit made September 20.
Peaches—Late Crawford.

H. G. Milling, Stamford. Exhibit made September 12th.
Pears—Bartlett, Flemish Beauty.
Peaches—Elberta.

J. G. Mitchell, Clarksburg. Exhibit made September 13th.
Plums—Arch Duke, Stoddart, Orient, Yellow Egg, Red Diamond, Monarch, Quackenboss, Glass Seedling, General Hand, Reine Claude, Gold, Coe's Golden Drop.
Awarded Honorable Mention.

E. Morden, Niagara Falls South. Exhibits made August 3, 13, 29, September 10, 12, 14, 18, 28, October 3, 9.
Peaches—Alexander, Early Rivers, Triumph, St. John, Champion, Elberta, Smock.
Pears—Boussock, Bartlett, Clapp's Favourite.
Grapes—Champion, Moore's Early, Niagara, Concord.
Flowers—Dahlias, Hydrangias, Eulalias.
Awarded Bronze Medal.

John Moore, St. Catharines. Exhibit made August 26th.
Pears—Clapp's Favorite.

Morris, Stone & Wellington, Fonthill. Exhibits made July 27, 24, August 10, 14, 17, 28, 31, September 4, 7, 14, 18. October 3.
Plums—Loveland, Yellow Egg, Reine des Mirabelles, American Violet, Fox, Red June, Lucy Grieve, Wickson.
Peaches—Triumph, Hortense Rivers, Lewis Seedling, Rentz Wonder, Golden Drop, Lemon Free, Fitzgerald, Champion, Seedling.
Apples—Summer Belle, Iona, Bohemian Girl.
Awarded Bronze Medal.

Cut Flowers—General and continuous exhibit of Roses, Dahlias, Begonias.
Award not made through error.

Thomas Mowers, St. Davids. Exhibit made September 20th.
Pears—Clarigeau.

Alex. Muir, Niagara. Exhibit made October 2nd.
Quinces—Orange.
Pears—Keiffer.

John Muir, St. Davids. Exhibit made September 20th.
Peaches—Crosby.

Robert Nixon, St. Catharines. Exhibit made July 10th.
Currants—Fay's Prolific.

Charles Ogg, Bartonville. Exhibit made October 8th.
Quinces.

D. O'Malley, St. Catharines. Exhibit made August 29th.
Plums—Burbank, Bradshaw.
Awarded Honorable Mention.

W. M. Orr & Son, Fruitland. Exhibits made July 6, 10, 11, 16, 20, 25, 27, August 5, 12, 17, 21, 28, 30, 31, September, 3, 5, 17, 20, 24, 30. October 2, 5, 8, 9, 14, 23.
Cherries—Windsor, Governor Wood, E. Richmond, Black Tartarian, Elkhorn, Napoleon, Biggariau, Cleveland, Schmidt's Biggariau, Yellow Spanish, Montmorency, English Morello.
Peaches—Alexander, E. Rivers, Wheatland, Smock, Steven's Rareripe, Centenial.
Pears—Giffard, Doyenne, Wilder, Clapp's Favorite, Louise Bonne, Ostrand's Summer, Sapairgauke, Bartlett, Souvenir du Congress, Duchess, General Druard, Idaho, Keiffer, Clairgeaus, D'Anjou, Sheldon, Bosc Seckel, Josephine de Malines.
Plums—Duane's Purple, Shipper's Pride, Bradshaw, Orleans Golden, Washington, Imperial Gage, Lowell's Seedling, Gueii, McLaughlin, Niagara, Red Egg, Galbraith, Smith's Orleans, Carman's Seedling, Beauty of Naples, Kingston, Green Gage, Quackenbos, General Hand, Pond's Seedling, Grand Duke, Canada Orleans, Sugar, Lombard, Belle de September, Wickson, Coe's Golden Drop, German Prune, Reine Claude, Damson, Purple Egg, Small Blue.
Grapes—Champion, Moore's Early, Niagara, Brighton, Wyoming Red, Delaware, White Mountain, Wilder, Catawba, Empire State, Agawam, Pocklington Concord, Vergennes, Salem, Isabella, Rogers No 44.
Quinces.
Apples—Astrakhan, Greening, Baldwin, Northern Spy.
Crab Apples—Gen. Grant, Whitney, Transcendent, Hyslop.
Nuts—Walnuts, Hickory.
Awarded Gold Medal
Awarded Wilder Bronze Medal.

Orser & Son, Bloomfield, Ont. Exhibit made July 15.
Cherries—Olivet.
Awarded Bronze Medal.

Henry Parker, Bayham. Exhibit made May 22.
Apples—Ben Davis.

Richard Painter, Jordan. Exhibit made July 16.
Currants—Fay, Cream Drop, White Smith.
Awarded Honorable Mention.

Edward Parnall, St. Catharines. Exhibit made August 8
Apples—Duchess.

James Parnall, St. Catharines Exhibit made August 8.
Pears—Giffard, Lawson.
Plums—Ogon.
Awarded Honorable Mention.

Seymour Parnall, St. Catharines· Exhibit made July 16.
Cherries—Seedling.

S. S. Parnall, St. Catharines. Exhibit made July 16, August 27.
Cherries—Seedling.
Plums—Niagara, Washington, Jefferson, St. Catharines.
Awarded Honorable Mention.

Jas. A. Patterson, St. Catharines. Exhibit made June 11, 15, 22, July 9, 16, September 3.
Strawberries—Vandevere, Brandywine.
Pears—Bartlett, Clapp's Favorite.

Raspberries—Marlboro', Hilborn, Gregg.
Currants—Fay, Cherry.
Awarded Bronze Medal.

F. G. H. Pattison, Grimsby. Exhibit made August 31.
Grapes—Moore's Diamond.
Apples—Wealthy.
Awarded Honorable Mention.

A. Pay, St. Catharines. Exhibits made June 18, July 8, August 12, 26, 27, 29, September 2, 3, 4, 6, 9, 10, 20, October 2, 23.
Strawberries—Splendid, Clyde, Glen Mary, Rio, Greenville, Darling, Crescent, Excelsior, Johnson's Early, Michel.
Flowers—Yucca, Crimson, Rambler.
Pears—Giffard, Clapp's Favorite, Bartlett, Sheldon, Triumph de Vienne, Beurre Clairgeau, Beurre Superfine, Doyenne' DuComice, Souvenir du Congress, Goodale, D'Anjou, Duchess, Josephine de Malines, Doyenne Boussock, Howell, Bergamot, Beurre Gris, Duchess de Angouleme, Lawrence, Mount Vernon, Belle Lucrative, Beurre Bosc, Winter Nelis, White Doyenne, Gray Doyenne, Keiffer, Louise Bonne de Jersey.
Plums—Burbank, Bradshaw, German Prunes, Moyer, Prince of Wales, Grand Duke, Yellow Seedling, Pond's Seedling, Paragon, Reine Claude.
Apples—Astrakhan.
Grapes—Moore's Early, Niagara, Worden, Roger's No. 4, Brighton, Concord.
Peaches—Champion, E. Crawford, Susquehanna.
Awarded Wilder Silver, and Gold Medal.

A. W. Peart, Burlington. Exhibits made July 26, August 14, 21, 23, 28, September 5, 11, 21, 25, 28, October 14.
Currants—Raby Castle, Red Dutch, Brayley's, Pomona, Prince Albert, Fay, Versailles, Belle de St. Giles, Wilder, North Star, Victoria, New Victoria, Red Cross, White Imperial, White Grape, Saunder's Black, Collin's Prolific.
Apples—E. Harvest, Cranberry Pippin, Greening, Baldwin, Rox. Russet, Tompkin's King, St. Lawrence, Northern Spy, Blenheim Pippin.
Pears—Clapp's Favorite, Giffard, Bartlett, Sheldon, Duchess, Belle Lucrative, D'Anjou, Keiffer.
Plums—Ogon, Botan, Marianna, Abundance, Damson, Moore's Artic, Burbank, Prince of Wales, Satsuma, Ireland's Seedling, Shropshire, Bradshaw, Gueii, Normands, Quackenbos, Hudson River Purple Egg.
Mulberries—Russian.
Peaches—Champion.
Tomatoes—Dominion Day.
Grapes—Moore's Early, Niagara, Worden, Roger No. 4, Brighton, Concord.
Awarded Bronze Medal.

E. Peart, Burlington. Exhibits made August 21, 30, September 6, 21, 28, October 14.
Plums—Niagara, Burbank, Washington, Yellow Egg, Satsuma, Hudson River, Purple Egg, Reine Claude, Ireland's Seedling Lombard, Normand, Monarch, Shipper's Pride, Gueii.
Pears—Bartlett, Sheldon, White Doyenne, Beurre, D'Anjou, Duchess.
Apples—Ribston, Duchess, Transcendent Crab, Wealthy, Mann, Baldwin, Greening, Tompkin's King.
Grapes—Lindley, Agawam, Concord.
Awarded Bronze Medal.

Thomas Peart, Freeman. Exhibit made September 28.
Grapes—Delaware Concord.

Francis Peck, Albury. Exhibits made September 16, October 11.
Apples—Black Detroit, Ribston, Lowell, Autumn Strawberry, Chenango, Strawberry, Baldwin, Ben Davis, Pumpkin Sweet, R. I. Greening, Northern Spy, Twenty Ounce, Maiden's Blush, Cranberry, Gloria-Mundi, Red Bietigheimer, Pound Sweet, Keswick Codling, Tompkin's King, Bailey Sweet, Mountain Greening, Hawley, Limber Twig, Wolf River, Fallawater, Canada Red, Cabashaw, Ontario, Magog Red Streak, Colvert, French Spitzenberg, Swaar, Hulbert, Red Detroit, Jenneting, Stark, Bottle Greening, Strawberry Pippin, Grime's Golden, Gravenstein, Sweet Greening, Seek-no-farther, Tolman Sweet, Mother, Gideon, Empress of Russia, Wagner, Hubbardstone, Fameuse, Bottle Russet, Streaked Pippin, Winter Snow, Atkin's Red Winter, Princess Louise, English Russet, Missouri Pippin, Primate, Minister, Newtown Pippin, Pewaukee, Gano, Arctic, McIntosh Red, Swayzie's Pomme Gris, Roxbury Russet, Pennock, La Rue.
Awarded Silver Medal.

John Pendergast & Son, St. David's. Exhibits made September 7, 17, October 2, 8.
Peaches—E. Crawfords, L. Crawfords, Globe, Smock.
Pears—Keiffer.
Awarded Honorable Mention.

George N. Peer, Freeman. Exhibits made August 9, 14, 16, 21, 23, 28, 30, September 6, 11, 21, 25, 28, October 5.
Pears—Lawson, Clapp's Favorite, Tyson, Bartlett, Giffard, Boussock, Goodale, Duchess, Sheldon, Louise Bonne de Jersey, Clairgeau, Beurre d'Anjou.
Apples—Primate, Duchess, Astrakhan, Sweet Bough, Wagner, Wealthy, Snow, Transcendent Crab, Greening.
Blackberries—Kittatinny, Western Triumph, Snyder.
Plums—Ireland's Seedling, Saunders, Aoundance, Burbank, Washington, Moore's Arctic, Prunus, Simonii, Duane's Purple, Niagara, Gueii, Bradshaw, Victoria, Shipper's Pride, Sugar, Common Blue, German, Lombard, Hudson River Purple Egg, Monarch, Pond's Seedling, Reine Claude, Staunton.
Elderberries—
Grapes—Wyoming Red, Moore's Early, Moore's Diamond, Delaware, Worden Niagara, Lindley, Brighton, Wilder, Concord, Agawam.
Tomatoes—Dominion Day.
Awarded Silver Medal.

W. E. A. Peer, Freeman. Exhibit made August 14, 28.
Plums—Ireland's Seedling.
Pears—Tyson.

Vernon R. Peer, Freeman. Exhibit made September 28, 29.
Nuts—Butternuts.

Andrew Pettit, Freeman. Exhibit made September 25.
Grapes—Niagara, Vergennes, Concords, Wilder.

A. C. Pettit, Southend. Exhibit made October 3.
Peaches—Crosby, Millionaire.
Awarded Honorable Mention.

A. H. Pettit, Grimsby. Exhibit made September 13.
Peaches—Crawford, Barnard, Mountain Rose.
Pears—Bartlett.
Awarded Honorable Mention.

Miss Pettit, Southend. Exhibits made September 18, October 3.
Flowers—Gladiolus, Dahlias.

C. C. Pettit, Fruitland. Exhibit made October 4, 23.
Plums—German Prunes, Wickson, Coe's Golden Drop, Reine Claude, Gen. Hand.
Peaches—L. Crawford.
Pears—Beurre D'Anjou, Louise Bonne de Jersey, Bartlett, Keiffer, Sheldon.
Quinces—
Grapes—Black Rogers, Catawba, Concord.
Awarded Honorable Mention.

Hugh Pettit, Freeman. Exhibit made September 25.
Grapes—Niagara, Concord, Wilder.

M. Pettit, Winona. Exhibits made Sept. 20, October 2.
Grapes Duchess, Alice, Croton, Roger No. 4, Lindley, Black Delaware, Pocklington, Early Dawn, Salem, Agawam, Victoria, Roger No. 1, Catawba, Niagara, Isabella, Roger No. 41, Oneida, Green Golden, Olita, Roger No. 28, Roger No. 34, Noah, Triumph, Lady, Woodruff Red, Cambridge, America, Diana.
Pears—Vicar of Wakefield, D'Anjou, Keiffer, Duchess.
Awarded Silver Medal.
Awarded Wilder Silver Medal. For display 110 varieties grapes.

H. Pickett, Clarkson. Exhibit made October 17.
Apples—Northern Spy, Ribston, Roxbury Russet, Tolman Sweet, Belleflower, Spitzenberg, Fall Pippin, Mann, Greening.

Isaac Pew, Niagara Falls South. Exhibit made September 28.
Grapes—Niagara.

Robert Pollock, Bartonville. Exhibit made October 8.
Raspberries—Twigs Red Raspberries.

D. D. Potter, St. Catharines. Exhibit made August 13.
Nuts—Walnuts (English).

G. D. Prest, Queenston. Exhibit made September 30.
Grapes—Niagara.

Percival Prest, Stamford. Exhibit made September 28.
Pears—Duchess, Beurre Clairgeau.
Grapes—Vergennes, Brighton, Delaware, Niagara, Salem.
Awarded Honorable Mention.

J. J. Pritchard, Harriston. Exhibits made September 21, October 21.
Apples—Alexander, Twenty Ounce, Pippin, Colvert, Wealthy, Duchess, Hyslop Crab, Northern Spy.
Awarded Honorable Mention.

Province of Ontario, Toronto. Exhibits made May 20, June 3, 10, 24, July 1, 15, 23, 24, September 13, 20, October 11, 18, August 6, 13, 20.
Display of Gooseberries, Strawberries, Plums, Peaches, Pears, Grapes, 1901 Apples, Cold Storage Apples.
Awarded eleven Gold Medals.

C. F. Purdy, St. Catharines. Exhibit made September 25.
Peaches—Purdy.
Awarded Silver Medal.

A. Railton, Fonthill. Exhibits made June 18, 20, July 16, 24, 26, 31, September 20, 25, 28, October 3, 10, 15, 19.
Strawberries—Clyde, Michel.
Raspberries—Cuthbert, Golden Queen, Eldorado, Gregg, Kittatinny.
Peaches—Elberta, Longhurst, Wheatland, Crosby, Late Crawford, Smock.
Grapes—Roger No. 15, Worden, Brighton, Roger No. 4, Niagara
Awarded Gold Medal.

Allen Ramsey, Queenston. Exhibit made September 3rd.
Peaches—Early Crawford.
Awarded Honorable Mention.

J. DeW. Randall, Niagara. Exhibits made August 13, October 1, 16.
Figs—White Genoa.
Awarded Bronze Medal.

M. A. Read, Port Dalhousie. Exhibit made September 25, 28 October 1, 2, 11.
Pears—White Doyenne, Duchess, Bordeaux, President Druard, Rutter, Josephine de Malines, Winter Nelis, Paul Ambre, Dr. Reeder, Louise Bonne, Seckel, Madame Eliza, Madame, Tryoe, Swan's Orange, D'Anjou, Keiffer, Goodale, Gemsel's Burgamot, Le Conte, Kingsessing, Bosc, Clairgeau, Brockworth Park, Sheldon, Bartlett, Souvenir du Congress, Flemish Beauty, Vermont Beauty, Eastern Belle.
Grapes—Massasoit, Duchess, Moore's Early, Early Victor, Jessica, Wyoming Red, Eldorado, Prentiss, Esther, Black Delaware, Hattie, Seedling, Lincoln, Roger No. 4. Lindley, Vergennes, Roger No. 9, Creveling, Concord, Northern Muscadine, Hartford Prolific, Chippewa, Cetewayo, Seedling White.
Peaches—Barnard, Crosby, Longhurst, Hill's Chili.
Awarded Silver Medal General Exhibit.
Awarded Silver Medal Lincoln Grape.

A. T. Reid, Orillia. Exhibit made October 11.
Apples—Culvert.

George Reid, Niagara. Exhibit made September 27.
Quinces—
Apples—Fall Pippin.

Isaac Reid, Orillia. Exhibit made October 11.
Apples—Fallawater.

William Rickard, Newcastle. Exhibit made May 21, September 27, October 8, 18.
Apples—Northern Spy, Tompkin's King, Alexander, Wagner, Ben Davis, Blenheim Pippin, R. I. Greening, Stark, Fallawater, Cabbashaw, Baldwin, Golden Russet, Canada Red, English Russet, Seek-no-farther, Pennock, Fameuse, Belleflower, Ontario.
Awarded Silver Medal.

W. B. Rittenhouse, Jordan. Exhibit made August 2.
Blackberries—Taylor.

Geo. A. Robertson, St. Catharines. Exhibits made September 16, 20.
Peaches—Elberta, Longhurst, Wheatland.
Awarded Honorable Mention.

J. Robinson, Niagara. Exhibits made September 12, 26, 27.
Peaches—Globe, Late Crawford, Wheatland.
Pears—Bosc.

Apples—Northern Spy, Crab.
Awarded Honorable Mention.

Mr. Robinson, Consecon. Exhibit made October 14.
Apples—Pewaukee.

Geo. Routh, Niagara. Exhibit made October 2.
Pears—Duchess.

Charles Rowe, Orillia. Exhibit made October 15.
Apples—Ben Davis, Longfield, American Golden Russet, Pewaukee, Wealthy.

James Sandham, Queenston. Exhibits made September 3, 7, 19, 24.
Peaches—Early Crawford, St. John, Old Mixon, Longhurst.
Awarded Honorable Mention.

Mrs. Senator Sandford, Hamilton. Exhibit made October 8.
Pears—Seckel, Sheldon.

Chas. Schwenger, Hamilton (41 McNab Street). Exhibits made September 4, 9.
Plums—Burbank.
Watermelon—
Melons—Montreal Nutmeg.
Cauliflower—
Awarded Honorable Mention.

John Scott, St. Catharines. Exhibits made July 15, August 16, 19, September 20.
Raspberries—Smith's Imperial, Hilborn, Cuthbert, Gregg, Golden Queen.
Plums—Early Purple, Saunders.
Peaches—Early Rivers.
Tomatoes—Matchless.
Awarded Bronze Medal.

Stafford Scratch, Kingsville, Exhibit made August 21.
Plums—Abundance, Burbank.

C. E. Secord, St. Catharines Exhibit made July 25, 30, August 6, 9, 12, 16, 20, 26, September 5, 9, 12, 18.
Raspberries—Cuthbert.
Peaches—Sneed, Alexander, Early Rivers, St. John, Foster, Early Crawford, Longhurst, Elberta, Late Crawford, Old Mixon.
Apples—Duchess, Alexander.
Pears—Giffard.
Grapes Champion, Brighton, Delaware, Moore's Early, Niagara.
Cut Flowers—
Awarded Silver Medal.

John Sexton, St. Catharines. Exhibit made July 16.
Gooseberries—White Smith.
Awarded Bronze Medal.

S. Shearer, Niagara. Exhibit made September 26, 27.
Peaches—Globe, Late Crawford, Elberta.
Pears—Sheldon.
Grapes—Moore's Diamond.
Awarded Honorable Mention.

Chas Sheer, Aldershot. Exhibit made September 4.
Watermelon—
Melon—Montreal Nutmeg.
Pumpkins—
Awarded Honorable Mention.

F. A. Sheppard, Queenston, Exhibit made September 3.
Peaches—Early Crawford, Mountain Rose.
Plums—Lombard.

J. Sheppard & Son, Queenston. Exhibit made August 6, 9, 13, 20, 27, September, 3, 7, 10, 13, 17, 20, 24, 26, October 28.
Blackberries—Lawton.
Apples—Astrakhan, Sweet Bough, Snow, Blenheim Pippin, King, Gravenstein, Baldwin, N. Spy.
Peaches—E. Rivers, St. John, Mountain Rose, Early Crawford, Coolridge's Favourite, White, Smock.
Plums—Abundance, Lombard, German Prune.
Grapes—Moyer, Champion, Moore's Early, Wyoming, Red, Green Mountain, Niagara, Brighton, Moore's Diamond, Pocklington, Woodruff Red, Worden, Lindley, Concord, Catawba.

Pears—Clapp's Favorite, Beurre Clarigeau, Keiffer.
Quinces—
Tomatoes—New Stone.
Awarded Silver Medal.

R. W. Shephard, Como, Quebec. Exhibit made October 2,
Apples—Fameuse.
Awarded Bronze Medal.

Isidore Shepley, Kingsville. Exhibit made September 25.
Apples—Snow, Wagner, Canada Red, Baldwin, Greening, Cayuga Red Streak.
Awarded Honorable Mention.

David Sinclair, Freeman. Exhibit made September 25.
Plums—Reine Claude.
Pears—Sheldon, D'Anjou.
Apples—Transcendent Crab, Golden Russet.

James Sinclair, Freeman. Exhibit made September 25.
Plums—Reine Claude.
Pears—D'Anjou.
Apples—Canada Red.

J. F. Sinclair, Aldershot. Exhibit made September 4.
Watermelon—

M. Slingerland, Niagara. Exhibit made September 27.
Apples—Swayzie's Pomme Gris.
Awarded Honorable Mention.

A. M. Smith, St. Catharines. Exhibit made June 18, 20, August 8, 16, September 9, 25, October 21.
Strawberries—Clyde, Splendid, Glen Mary, Excelsior, Williams.
Raspberries—Gregg.
Plums—Early Purple, Abundance, Red, June, Prunus Simonii, Satsuma, Glass Seedling, Burbank, Yellow Egg.
Pears—Wilder, Lawson, Souvenir du Congress, Duchess d'Anjou.
Peaches—Alexander, E. Crawford, Champion, Mountain Rose, Carlyle, Barnard, Old Mixon, Elberta, Late Crawford, Steven's Rareripe.
Quinces—
Awarded Silver Medal.

E. D. Smith, Winona. Exhibit made August 20.
Blackberries—Kittatinny.
Peaches—Triumph, Greensboro'.
Plums—Milton, Wildgoose, Saunders, Lowrey's Gage.
Awarded Honorable Mention.

J. H. Smith, St. Catharines. Exhibit made October 8.
Apples—Primate.
Grapes—Wilder, Roger No. 19, Roger No. 14.

Smith & Reed Co., St. Catharines. Exhibit made July 10.
Cherries—Tartarian.

T. Smith, St. Catharines. Exhibits made August 12, September 10, 16, 26.
Peaches—Alexander, Foster, Late Crawford.
Melons—Montreal Nutmeg.
Awarded Honorable Mention.

Robert Spence, Niagara Falls South. Exhibits made September 18, October 11.
Peaches—Crosby, Elberta, Smock, White.

D. W. Springer, Port Nelson. Exhibit made August 28.
Plums—Imperial Gage, Red Egg, Bradshaw.
Pears—Clapp's Favorite.
Awarded Honorable Mention.

S. Spillett, Nantyr. Exhibit made July 18.
Gooseberries—Champion, Ontario, Antwerp, Marion, Red Jacket, Keepsake, Columbia. Triumph, Chautauqua, Carney Seedling, Queen, Lan Lad, Green Chisel, Downing, White Smith, Golden Prolific, Dominion, Pearl, Crown Bob.

O. T. Springer, Burlington. Exhibit made August 30
Pears—Boussock, Bartlett.
Plums—Niagara.
Peaches—Early Rivers.

C. L. Stephens, Orillia. Exhibit made July 20, October 11, 18.
Gooseberries—Pearl, Industry, White Smith, Smith Improved, Warrington Red, Downing, Imperial, Seedlings No. 1, 2, 6, 10, 12, 14, 16, 19, 21, 28, 29.
Apples—Tompkin's King, Ben Davis, Golden Russet, Salome, Fameuse, Plumb's Cider, Stark, Wolf River, Wealthy, McIntosh, Tolman Sweet, Fall Dessert.
Awarded Silver Medal.

E. Stephenson, Oshawa. Exhibit made August 29.
Plums—Glass Seedling.
Apples—Whitney Crab.

E. B. Stevenson, Jordan Station.
Display of Strawberries in solution.
Awarded Bronze Medal.

Alex. Stewart, St. Catharines. Exhibits made August 2, 20.
Apples—Astrakhan, Yellow Transparent.
Awarded Honorable Mention.

F. G. Stewart, Homer. Exhibits made July 8, 11, 15, August 2, 6, 16, 26, September 3, 20, 27, October 1, 8, 14.
Cherries—Early Richmond, Yellow Spanish, Tartarian, Windsor, Montmorency.
Apples—Early Harvest, Astrakhan, Northern Spy, Yellow Transparent.
Plums—Ogon, Abundance, Niagara, Burbank, Yellow Egg.
Peaches—Alexander.
Grapes—Champion, Jessica, Moyer, Moore's Early, Rogers No. 9, Rogers No. 19, Delaware, Brighton, Salem, Rogers No. 3, Concord, Wilder, Woodruff Red, Vergennes, Worden, Moore's Diamond, Niagara, Empire State, Green Mountain, Catawba, Lindley.
Awarded Gold Medal.

Mrs. Stewart, Leamington. Exhibit made August 10.
Apples—Duchess.

J. D Strang, Moffat. Exhibit made July 13.
Currants—Cherry.
Gooseberries—Industry.

James Symington, Port Dover. Exhibit made September 25.
Grapes—Rogers No. 9, Niagara, Worden, Delaware, Wilder, Brighton, Wyoming Red.
Awarded Honorable Mention.

Geo. Sexsmith, Stone Quarry, Bertie. Exhibit made September 1.
Display of Sweet Peas.

Wilfred Thompson, St. Catharines. Exhibits made July 25, August 26, 29, September 4, 9, 12, 16, 18, 23, 27, 30, October 2, 15, 21, 23.
Cherries—Morello.
Peaches—St. John, E. Crawford, Elberta, L. Crawford, Steven's Rareripe.
Grapes—Champion, Lady, Moore's Early, Worden, Concord, Creveling, Rogers No. 4, Hartford, Clinton, Brighton, Rogers No. 2 and No. 3, Vergennes, Iona, Pocklington, Niagara, Salem, Lindley, Diana.
Apples—Baldwin.
Pears—Keiffer.
Awarded Silver Medal.

E. Thorp, Burlington. Exhibit made August 14.
Blackberries—Erie.

James Titterington, St. Catharines. Exhibits made June 18, 22, July 15, 16, 30, August 2, 5, 6, 13, 16, 19, 26, 27, 29, September 3, 10, 14, 18, October 9.
Strawberries—Clyde, Splendid, Glen Mary, Rio, Duff, Seaford, Williams, Greenville, Darling, Crescent, Excelsior, Michel, Johnson's Early.
Cherries—Montmorency.
Tomatoes—
Gooseberries—White Smith.
Plums—Willard, Ogon, Abundance, Yellow Japan, Red June, Climax, Wickson, New Bartlett, Shiro, Gold, Burbank, Washington, Paragon, Green Gage, Victoria.
Black Currants—Champion.
Peaches—Alexander, E. Michigan, Seedling.
Pears—Bartlett, Sheldon, Howell, Bosc, Clairgeau, Souvenir du Congress.
Grapes—Prentiss, Rogers No. 15, Rogers No. 44, Rogers No. 22.
Melons—Montreal Nutmeg.
Awarded Gold Medal.

Mrs. J. Titterington, St. Catharines. Exhibit made September 30.
Peaches—Seedling.

J. Tweddle, Fruitland. Exhibits made August 19, 20, 30, September 28, October 2, 16.
Apples—Yellow Transparent, Astrakhan, Duchess, Golden Russet, Fameuse, Baldwin, Kings, Greening, Northern Spy.
Pears—Lawson, Giffard, Clapp's Favorite, Howell.
Plums—Niagara, Canada Orleans, Washington, Reine Claude.
Peaches—Longhurst, Hill's Chili.
Awarded Silver Medal.

Jarl Utter, Bartonville. Exhibit made October 2.
Peaches—Smithson.

R. Vandeburg, Orillia Exhibit made October 11.
Apples— Ben Davis, Culvert.

Van Duzer & Griffith, Grimsby. Exhibits made June 20, July 11, 20, September 10, October 9.
Strawberries—Clyde.
Gooseberries—Pearl, Downing.
Currants—Cherry, Fay.
Cherries—Early Richmond, Napoleon, Black Tartarian, Montmorency, Windsor, Elkhorn, Reine Hortense.
Pears—Bartlett, Le Conte.
Awarded Bronze Medal.

W. H. Vrooman, Queenston. Exhibits made September 3, 17, 20.
Peaches—Mountain Rose, Elberta, Crosby, Old Mixon.
Awarded Honorable Mention.

Fred Truman, St. Catharines. Exhibit made July 8.
Collection of Verbenas and Foliage Plants.

J. W. Wainman, Orillia. Exhibit made October 11.
Apples—Tompkin's King, Mann, Northern Spy.

Mr. Wild, Hamilton. Exhibit made October 14.
Pears—Howell, B. Superfine, B. Clairgeau, Vicar of Wakefield, D'Anjou, Winter Nelis, Goodale.
Awarded Honorable Mention.

G. X. Walker, St. Catharines. Exhibit made September 2.
Grapes—Moore's Diamond.

J. Walker, Niagara. Exhibit made September 27.
Pears—Duchess.

E. Wallis, Orillia. Exhibit made October 11.
Apples—Fall Cooking.

Thomas Walton, Freeman. Exhibit made August 21.
Plums—Ireland's Seedling, Moore's Arctic.

J. J. Ward, Consecon. Exhibit made October 14.
Apples—St. Lawrence, McIntosh Red, Fameuse, Ontario.

W. A. Warner, Trenton. Exhibit made September 2.
Apples—Duchess, Hyslop Crab, Mann, Pewaukee, Alexander, McIntosh Red, Bietigheimer.
Awarded Honorable Mention.

W. Warnock, Goderich. Exhibit made September 23.
Grapes—Moore's Diamond, Vergennes, Wilder, Concord, Hartford, Brighton, Empire State, Merrimac, Campbell's Early, Massassoit.

Dr. T. H. Watt, Niagara. Exhibits made September 19, 26, 27.
Peaches—Longhurst, Crosby, Late Crawford.
Pears—Clairgeau, Lawrence, Sheldon.
Plums—Archduke.
Apples—Maiden's Blush.
Awarded Honorable Mention.

Russ. Weeks, Consecon. Exhibit made October 14.
Apples—Golden Russet, Betigheimer.

Salem Weeks, Consecon. Exhibit made October 14.
Apples—Wealthy

W. Weir, Niagara. Exhibits made September 27, October 2.
Pears—B. Clairgeau, Keiffer, Mt. Vernon.
Apples—Swazyie's Pomme Gris.

B. Welstead, St. Catharines. Exhibit made September 2.
Grapes—Worden, Moore's Early, Niagara.

Mrs. Whaley, Ancaster. Exhibit made October 8.
Apples—Black Detroit.
C. E. White, St. Catharines. Exhibits made July 9, 18, August 5, 12.
Cherries—Early Richmond, Montmorency.
Peaches—Alexander.
Pears—Giffard, Doyenne.
Awarded Honorable Mention.
O. F. Wilkins, Bridgeburg. Exhibits made September 10, 23.
Grapes—Bridgeburg Beauty, Seedling Canadian, Moyer, Conqueror Seedling, Eaton, Moore's Diamond, Wyoming Red, Early Ohio.
Peaches—Crosby, Elberta.
Awarded Honorable Mention.
A. H. Woodbridge, Kingsville. Exhibits made September 2, 5.
Peaches—Champion, Early Crawford.
Frank Woodruff, St. David's. Exhibit made August 6.
Blackberries—Lawton.
H. C. Woodruff, St. David's. Exhibits made August 24, September 3, 13, October 2, 8.
Grapes—Moore's Early, Green Mountain, Lindley, Niagara, Delaware, Vergennes, Concord.
Pears—Keifler.
Awarded Honorable Mention.
W. Woodruff, St. Catharines. Exhibit made September 26.
Grapes—Vergennes.
Edgar J. Woolverton, Grimsby. Exhibit made October 29.
Pears—Sheldon.
L. Woolverton, Grimsby. Exhibits made August 6, 7, 16, 22, 27, September 2, 3, October 2, 3, 4.
Currants—White Holland, Prince of Wales, London Market, Black Naples, Champion, Black Victor, Collin's Prolific.
Peaches—Schumaker, Sneed, Alexander, Early Rivers, Hynes' Surprise, E. Hilborn, Champion, Yellow St. John.
Pears—Doyenne, Early Harvest, Clapp's Favorite, Giffard, Rostiezer, LeConte, Elizabeth, Sheldon, Triumph de Vienna, D'Anjou, Winter Nelis, Clairgeau, Keiffer, Duchess.
Apples—Astrakhan.
Plums—Peach Imperial, Royal.
Quinces—Vandeman, Bentley, Orange.
Grapes—Geneva, Telegraph, Cottage, Janesville, Marin Kalin, Hartford, Prolific, Bacchus, Concord, Muscatel, Goethe, Brighton, Brilliant, Black Eagle, Empire State, Barry Mills, Haskell 4, Iona, Moore's Diamond, Kensington, Black Giant, Noah, Pearl, Missouri Reisling, Transparent, Northern Muscatine, Rogers No.24, Dracut Amber, Rogers No. 19 and No. 30, Wyoming Red, Lindley, Duchess, Early Victor, Niagara, Perkins, Delaware, Agawam, Vergennes, Prentiss, Esther, Croton, America, Montifore, Ivers, Oneida, Ella, Maomi, Mary, Alice, Jefferson, Colerian, Salem, Rebecca, Worden, Pocklington, Triumph, Green Mountain, Eumelan, Elvira, Martha, Norfolk, Eldorado, Faith, Gairtner, Diana, Northern Light, Victoria.
Awarded Gold Medal.
J. B. Young, Niagara Falls South. Exhibit made September 28.
Pears—D'Anjou, Sheldon, Clairgeau, Bosc, Kirtland.

Miscellaneous Exhibits.

Province of Ontario. Exhibits made May 20, continuous.
Installation of Exhibit.
Awarded Silver Medal.
Province of Ontario. Exhibit made May 20, continuous.
300 Jars Assorted Canned Fruits.
Awarded Silver Medal.
Province of Ontario. Exhibit made July 1, continuous.
General Display of Native Wines.
Awarded Gold Medal.
Province of Ontario. Exhibit made July 1, continuous.
50 Bottles Fruits in Solution.
Awarded Bronze Medal.
Shuttleworth & Harris, Brantford. Exhibits made May 20, continuous.
General Display of Pickles and Relishes.
Awarded Silver Medal.

Prof. H. L. Hutt, Ontario Agricultural College, Guelph. Exhibit made July 1, continuous.
96 Jars Assorted Fruits in Solution.
Awarded Silver Medal.
G. C. Caston, Craighurst. Exhibits made May 20, continuous.
36 Jars Fruit in Solution.
Awarded Honorable Mention.
L. Woolverton, Grimsby. Exhibits made May 20, continuous.
40 Jars Fruit in Solution.
Awarded Bronze Medal.
Ontario Fruit Growers' Association.
Horticultural Literature.
Awarded Bronze Medal.
R. J. Graham, Belleville. Exhibits made July 1, continuous.
24 Jars Evaporated Fruits and Vegetables.
Awarded Bronze Medal.
Ontario Grape Growing & Wine Manufacturing Co., St. Catharines. Exhibits made May 20, continuous.
Display of Native Wines.
Awarded Bronze Medals.
J. S. Hamilton & Co., Brantford. Exhibits made July 1, continuous.
Display of Native Wines, Brandies, and Champagnes.
Awarded Bronze Medal.
E. Girardot Wine Co., Sandwich. Exhibits made July 1. (Continuous).
Display of Native Wines.
Awarded Bronze Medal.
L. M. Schenck & Co., St. Catharines. Exhibits made May 20. (Continuous).
Display of Assorted Canned Fruits and Vegetables.
Awarded Honorable Mention.
A. Bain, Springbank Mineral Water Co., St. Catharines. Exhibits made July 1. (Continuous).
Display of Mineral Water.
Awarded Honorable Mention.
Spramotor Co., London. Exhibits made May 20. (Continuous).
Collective display of Spraying and Whitewashing Machinery and Spray Pumps.
Awarded Gold Medal.
Ontario Experiment Stations. Exhibits made September 12.
General display of Fruits in Season. 250 plates.
Awarded Wilder Silver Medal.
M. Pettit, Winona. Exhibit made September 12.
General display of Out-door Grapes. 110 varieties.
Awarded Wilder Silver Medal.
Albert Pay, St. Catharines. Exhibit made September 12.
General collection of Fruits in Season. 120 plates.
Awarded Wilder Silver Medal.
W. M. Orr, Fruitland. Exhibit made September 12.
General collection of Fruits in Season.
Awarded Wilder Bronze Medal.

Decorative Contributions.

Department of Agriculture, Toronto.....Collection of Pictures.
Frank Coy, St. Catharines .....Mounted Deer's Head and Pictures.
Dr. F. S. Kilmer, St. Catharines .....Mounted Deer's Head.
Dr. A. May, St. Catharines.....Mounted Deer's Head and Pictures.
E. J. Lovelace, St Catharines .....Mounted Deer's Head.
R. Thompson, St. Catharines.....Mounted Deer's Head.
Albert Pay, St. Catharines .....Mounted Deer's Head, Birds and Pictures.
Dr. J. H. Comfort, St. Catharines.....Mounted Birds.
E. Hack, St. Catharines .....Mounted Bird.
Wm. Carter, Glencoe .....Picture, Fruit Scene.
Wm. Houston, Central Prison, Toronto ....Collection of Palms and Decorative Plants.

Summary.

Total number of Exhibitors	326
Total number of varieties of Fruit shown	577
Total number of Plates displayed	8,650
Total number of Awards given	215

VEGETABLE EXHIBIT IN AGRICULTURE DEPARTMENT.

Awarded Honorable Mention.

Province of Ontario ..... Display of Peppers.
James Titterington, St. Catharines ..... Matchless Tomatoes.
" " ..... Ruby King Peppers.
" " ..... Egg Plant.
" " ..... Sweet Potatoes.
" " ..... Montreal Nutmeg Melons.
John W. Blain, " ..... Seedling Tomatoes.
C. W. Ashbaugh, Mohawk ..... Matchless Tomatoes.
" " ..... Fanny Clyde Tomatoes.
J. A. Leckie, Clarkson ..... Italian Vegetable Marrow Squash
" " ..... Marrow Dark Green Squash.
" " ..... Vegetable Marrow Squash.
J. F. Sinclair, Aldershot ..... Watermelon.
" " ..... Watermelon.
C. Scheer, " ..... Montreal Nutmeg Melon.
Chas. Schwenger, Hamilton ..... Montreal Nutmeg Melon.
" " ..... Cauliflower.
Gordon Bunting, St. Catharines ..... Hackensack Melon.
" " ..... Hackensack Melon.
Thomas Smith " ..... Montreal Nutmeg Melon.
T. R. Merritt " ..... Round Purple Egg Plant.
" " ..... Long Purple Egg Plant.
J. Sheppard & Son, Queenston ..... Ignotum Tomatoes.
John Scott, St. Catharines ..... Matchless Tomatoes.
Albert Pay, " ..... Hackensack Melons.
R. L. Huggard, Whitby ..... Tomatoes.
John Dunn, St. Davids ..... Ponderosa Tomatoes.

Silver Medals.

Albert Pay, St. Catharines ..... Asparagus.
George Boyt " ..... Asparagus.

FLORICULTURAL EXHIBITS.

Gold Medals.

John H. Dunlop, Toronto ..... Tender Roses.
H. H. Groff, Simcoe ..... Gladioli.

Silver Medals.

J. Gammage & Son, London ..... Carnations.
John H. Dunlop, Toronto ..... Carnations.

Bronze Medals.

W. J. Lawrence, Mimico ..... Tender Roses.
The H. Dale Estate, Brampton ..... Tender Roses.
R. Cameron, Niagara Falls ..... Dahlias.

Honorable Mention.

T. J. Farmer, Port Dalhousie ..... Dahlias.

Mr. John H. Dunlop was awarded the only Gold Medal for tender roses on his exhibit of about 400 blooms.

Mr. H. H. Groff's awards for Hybrid Gladioli consisted of the following :

Pan-American Exposition Gold Medal.
Pan-American Silver Vase, awarded by Buffalo Florists Club.
Certificate of Merit, by Society of American Florists and Ornamental Horticulturists.
Thirteen first prizes by Pan-American Exposition.

VARIETIES OF APPLES.

Arctic
A. Pippin
Antonovka
Alexander
Autumn Strawberry
Beauty of Kent
Ben Davis
Belle Russett
Boikon
Baldwin
Bretigheimer
Blenheim
Black Detroit
Bailey Sweet
Belleflower
Baxter or La Rue
Barcelona Pearmain
Bismarck
Blunt
Bush Sweet
Chenango Strawberry
Canada Red
Cross
Colvert
Cranberry
Coo's River Beauty
Cabbachie
Duke of Connaught
Duchess of Oldenburg
E. Spitzenburg
Eicke
English Russett
Edgehill
Fameuse
Fall Orange
Fall Pippin
Fallawater
Gideon
Gano
Gravenstein
Greening
Garden Gem
Grand Sultan
Golden Russett
Golden Sweet
Gloria Mundi
Gravel Pippin
Gibson
Grimes' Golden
Hawthorne
Hawthornden—New
Hubbardston
Hamilton
Hawley
Haas
Holland Pippin
Isham
Ingram
Isabella
Jenneting
Kentish Fillbasket
King
Jelliflower
Lowell
La Victoria
McIntosh Red
Mother
Maiden's Blush
Mann
Magog Red Streak
McLean
Maggie's Favorite
Mann Pippin
Munson's Sweet
Mammoth Black Twig
Milwaukee
Melinda
Missouri Pippin
McMahon White
North Star
Northfield Beauty
Northern Spy
Norcaster Spy
Northwestern Greening
Ontario
Old Pearmain
Peter
Pewaukee
Primate
Palouse
Pennock
Pumpkin Sweet
Pound
Peerless
Pioneer
Phoenix
Parlin
Patten Greening
Princess Louise
Pound Sweet
Plumb's Cider
Peck Pleasant
Quebec Winter Sweet
Russell
Ribston Pippin
Roxbury Russett
Rochelle
Reinette
Rolfe
Red Russett
Repka Winter
Scarlet Pippin
St. Lawrence
Stump
Saxon
Schweitzer
Swayzie's Pomme Gris
Sweet Bough
Strawberry Pippin
Starr
Salome
Stark
Seek-no-farther
Scott's Winter
Shiawassee Beauty
Striped Winter
Twenty Ounce
Trenton
Tolman Sweet
Van Morris Reinette
Wolf River
Wagner
Wealthy
Windsor Chief
Wharton
Washington Strawberry
Winter Maiden's Blush
Western Beauty.

VARIETIES OF GRAPES.

Amber
Aleita
Alice
Brighton
Brilliant
Black Delaware
Baccus
Black Eagle
Black Giant
Concord
Creveling
Champion
Clinton
Catawba
Cottage
Colerain
Chippewa
Cetewayo
Croton
Cambridge
Concord Muscat
Diamond
Delaware
Duchess
Diana
Dracut Amber
Empire State
Eaton
Early Ohio
Early Victor
Early Dawn
Eldorado
Esther
Etta
Eumelian
Elvira
Green Golden
Green Mountain
Geneva
Hartford
Hattie
Haskell
Herbert
Iona
Isabella
Ivers
Jessica
Jefferson

VARIETIES OF GRAPES—*Continued.*

Janesville
Kensington
Lady
Lincoln
Moore's Early
Moyer
Martha
Marion
Mills
Missouri Reisling
Montefore
Mary
Niagara
Noah
Northern Muscadine
Naomi
Norfolk
Northern Light
Oleita
Oneida
Pocklington
Prentiss
Pearl
Perkins
Rogers 1
" 3
" 4
" 9
" 15
" 19
" 22
" 28
" 30
Rogers 34
" 39
" 41
" 44
Rebecca
Regina
Triumph
Telegraph
Tocolon
Transparent
Vergennes
Victoria
Worden
Wyoming Red
Woodruff Red
Winchell.

VARIETIES OF PEARS.

Angouleme, Duchess de
Anjou
Bartlett
Bosc
Bergamot
Beurre Gris
Brockworth Park
Boussock
Buffum
Clairgeau
Clapp's Favorite
Comice, Doyenne du
Diel
Druard President
Dr. Reider
Doyenne de Etle
Eastern Belle
Flemish Beauty
Frederick Clapp
Giffard
Giant Morceau
Goodale
Gray Doyenne
Hardy Beurre
Howell
Idaho
Japanese Golden Russett
Keiffer
Kingsessing
Lawrence
LeConte
Lawson
Louise Bonne de Jersey
Lucrative Belle
Le Abbe de Paris
Malines, Josephine de
Mount Vernon
Onondaga
Rutter
Rostezer
Seckle
Sheldon
Souvenir du Congress.
Superfine
Tyson
Triumph de Vienna
Vermont Beauty
White Doyenne
Wilder
Winter Nelis.

VARIETIES OF PEACHES.

Alexander
Amsden June
Brigden or Garfield
Bronson
Coolridge's Favorite
Centennial
Chair's Choice
Champion
Chili Hill's
Carlisle
Crosby
Duke of York
Early Rivers
Early Michigan
Early Barnard
Early Crawford
Elberta
Fitzgerald
Foster
Georgia, Belle of
Globe
Golden Drop
Greensboro'
Hale
Hynes' Superfine
Hilborn
Honest John
Hortense Rivers
Jacques' Rareripe
Longhurst
Late Crawford
Late Rareripe
Lemon Free
Millionaire
Mrs. Brett
Mountain Rose
McLide's Seedling
Old Mixon Free
Purdy
Pratt
Pearce's Yellow
Reeve's Favorite
Richmond
Smithson
Smock
Sneed
Steven's Rareripe
St. John
Stump
Susquehanna
Tyhurst
Triumph
Wager
Waterloo
Wheatland
Yellow Rareripe
Yulu
Kalamazoo
Namaper
Mary's Choice
Oscar's Black Prince
Red Rivers.

VARIETIES OF PLUMS.

Abundance
Arch Duke
American Violet
Burbank
Bradshaw
Berkmans
Beauty of Naples
Belle de September
Botan
Chabot
Common Blue
Coe's Golden Drop
Carman's Seedling
Canada Orleans
Duane's Purple
Diamond
Damson
Early Purple
Ford's Early
Fox
Green Gage
Glass Seedling
General Hand
Gueii
German Prunes
Grand Duke
Galbraith
Gold
Imperial Gage
Ireland's
Imperial Blue
Kingston
Lowell's Seedling
Lucy Grieve
Lowrey's Gage
Loveland
Lombard
Magnum Bonum
Moyer
Marianna
Montreal Beauty
Monarch
McLaughlin
Moore's Arctic
New Bartlett
Niagara
Normands
Orient
Orange
Ogon
Orleans Golden
Peach Imperial
Purple Egg
Prunus Simoni
Prince of Wales
Paragon
Pond's Seedling
Quackenboss
Royal
Reine Claude
Red Diamond
Reine Des Mirabelles
Red Egg
Red June
Shipper's Pride
Stoddart
Shiro
Satsuma
Staunton
Sugar
Smith's Orleans
Shropshire
Victoria
Washington
Willard
Wickson
Wray's Seedling
Yellow Egg.

VARIETIES OF STRAWBERRIES.

Aroma
Brandywine
Bubach
Bismarck
Clyde
Corsican
Crescent
Duff
Darling
Excelsior
Glen Mary
Greenville
Gladstone
Gandy
Haverland
Johnson's Early
Lovet
Michel
Marshall
Margaret
New York
Nick Ohmer
Pride of Cumberland
Ruby
Rio
Sample
Splendid
Seaford
Saunders
Tennessee Prolific
Vandevere
Van Deman
Williams
William Belt
Wilson
Warfield
Woolverton.

VARIETIES OF CHERRIES.

Black Tartarian
Black Heart
Cleveland
English Morello
Early Purple
Elkhorn
Early Richmond
Governor Wood
Montmorency
Napoleon Biggariau
Olivet
Reine Hortense
Seedling
Schmid's Biggariau
Windsor
Yellow Spanish

VARIETIES OF RASPBERRIES.

Cuthbert
Gregg
Golden Queen
Hilborn
Marlboro'
Smith's Imperial
Turner.

VARIETIES OF BLACKBERRIES.

Eldorado
Erie
Kittatinny
Lawton
Snider
Taylor
Western Triumph.

VARIETIES OF CURRANTS.

Black Naples
Black Champion
Brayley's
Belle de St. Giles
Cherry
Cream Drop
Collins' Prolific
Fay's Prolific
Lee's Prolific
New Victoria
North Star
Prince Albert
Pomona
Raby Castle
Red Dutch
Red Cross
Saunders' Black
Versaillaise
Victoria
Wilder
White Imperial
White Grape.

VARIETIES OF GOOSEBERRIES.

Antwerp
Crown Bob
Champion
Columbia
Chautauqua
Carney's Seedling
Downing
Dominion
Green Chisel
Golden Prolific
Golden Ball
Industry
Keepsake
Lan Lad
London
Marion
Ontario
Pearl
Queen
Red Jacket
Smith's Improved
Steven's Seedlings
Triumph
Warington Red
Wellington
White Smith.

EIGHTH ANNUAL REPORT

OF THE

FRUIT EXPERIMENT STATIONS

OF

ONTARIO,

UNDER THE JOINT CONTROL OF THE

ONTARIO AGRICULTURAL COLLEGE, GUELPH

AND THE

FRUIT GROWERS' ASSOCIATION OF ONTARIO

1901.

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TORONTO.

EIGHTH ANNUAL REPORT

OF THE

ONTARIO FRUIT EXPERIMENT STATIONS

1901.

To the Honorable John Dryden, Minister of Agriculture:

Sir,—We have the honor to submit to you the Eighth Annual Report of the Fruit Experiment Stations of Ontario. Hitherto our experimenters have been reporting on older varieties; you will observe that now they are able to include many new varieties of later planting. Our work will now constantly grow upon our hands, and will require closer attention from your officers if the full benefit of our tests are to be given to the public.

We have the honor to be, Sir,

Your obedient servants,

Jas. Mills, Chairman.
Linus Woolverton, Secretary.

BOARD OF CONTROL, 1902.

REPRESENTING THE COLLEGE.

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REPRESENTING THE ONTARIO FRUIT GROWERS' ASSOCIATION.

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W. M. ORR ..... Fruitland.
A. H. PETTIT ..... Grimsby.
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EXECUTIVE COMMITTEE.

Chairman—JAMES MILLS, M.A., LL.D.
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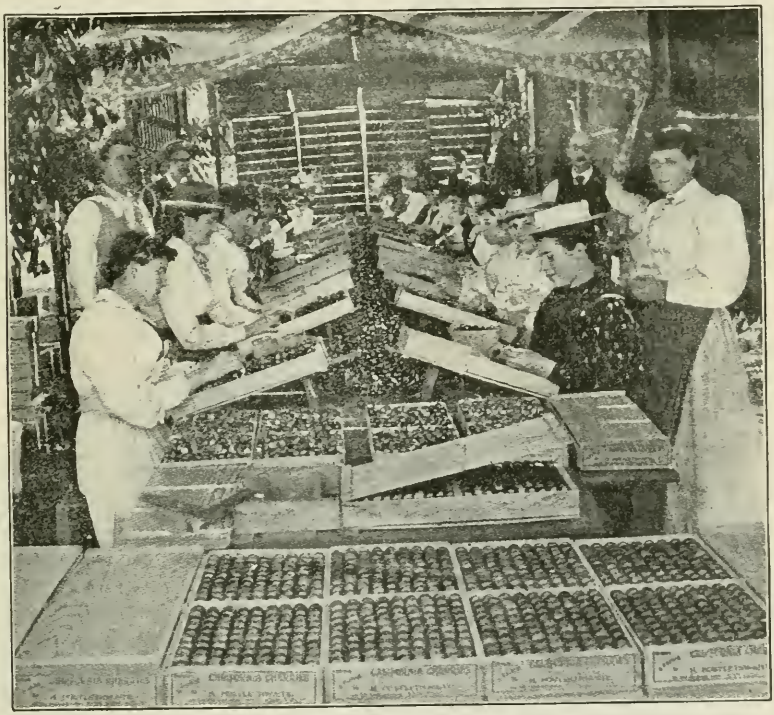
THE ONTARIO FRUIT STATIONS.

	Name.	*Specialty.*	*Experimenter.*
1.	Southwestern	Peaches	W. W. HILBORN, Leamington.
2.			
3.	Wentworth	Grapes	MURRAY PETTIT, Winona.
4.	Burlington	Blackberries and Currants	A. W. PEART, Freeman.
5.	Lake Huron	Raspberries	A. E. SHERRINGTON, Walkerton.
6.	Georgian Bay	Plums	J. G. MITCHELL, Clarksburg.
7.	Simcoe	Hardy Apples and Hardy Cherries	G. C. CASTON, Craighurst
8.	East Central	Pears and Commercial Apples	R. L. HUGGARD, Whitby.
9.	Bay of Quinte	Apples	W. H. DEMPSEY, Trenton.
10.	St. Lawrence	Hardy Plums and Hardy Pears	HAROLD JONES Maitland.
11.	Strawberry Station		E. B. STEVENSON Jordan Station
12	Gooseberry Station		STANLEY SPILLETT, Nantyr.
13.	Maplehurst	General collection of all kinds of fruits for descriptive work for "Fruits of Ontario"	L. WOOLVERTON, Secretary.
14.	Algoma	Hardy Fruits	C. YOUNG, Richard's Landing.
15.	Wabigoon	Hardy Fruits	A. E. ANNIS, Dryden.

FRUITS OF ONTARIO.

Described and Illustrated by Mr. L. Woolverton, Secretary of the Ontario Fruit Experiment Stations.

Fruit growing has become so important an industry in the Province of Ontario, that it deserves every encouragement at the hands of the Department of Agriculture. The Canadian farmer who contemplates growing fruit asks for information on two points in particular, viz., (1) What fruits shall I plant, and (2) How shall I cultivate them? The latter of these questions it is the province of the Ontario Fruit Growers' Association to answer through the Canadian Horticulturist and the Annual Report, while the former question is one that can be solved only by years of patient experimental work by our fruit experiment stations.



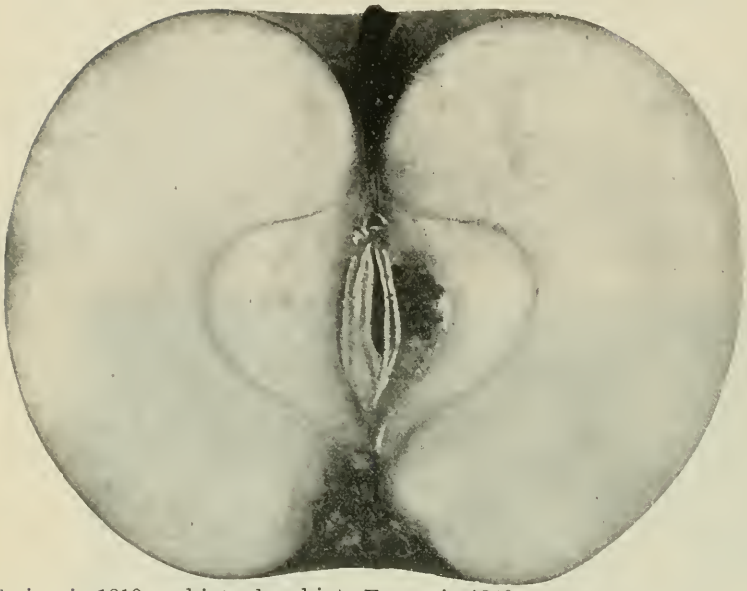
Cherry Packing in California.

Of equal importance is some means of identifying all varieties now grown in our Province, and of knowing with some degree of exactness the size, color, general appearance and real value of these varieties aside from the catalogues of the nurserymen. To meet this latter need, the Secretary, with the advice and approval of the Board of Control, has begun the work of illustrating and describing the fruits of Ontario; and in this work he desires to acknowledge the valuable aid of the various fruit experimenters. The illustrations are all new and original, having been engraved from photographs made the exact size of the fruit samples, except where otherwise specified, and in this way there will in time be made accessible to the Ontario fruit growers a complete guide to all the fruits grown in the Province. Such a work necessarily must be slow and tedious, but it is all important that it should be characterized by scientific accuracy, and the writer invites notes or criticism from pomologists generally.

APPLES.

BLENHEIM.

(Blenheim Orange, Blenheim Pippin, Woodstock.)



An apple that is constantly gaining in favor with both grower and consumers, because of its size, its beauty, its evenness of form and general excellence for cooking and dessert purposes. It is grown in the counties of Prince Edward, Victoria, Lincoln and elsewhere, and is highly valued as a commercial apple. It certainly deserves to be more generally planted.

Origin : A garden in Woodstock, England, near the residence of the Duke of Marlboro'; shown at a meeting of the London Horticultural Society in 1819, and introduced into France in 1840.

Tree : Very vigorous in habit and consequently a scant bearer while young, but a regular and abundant bearer as it grows older; dwarfed on the Paradise stock the tree becomes an early bearer.

Fruit : Large to very large on favorable soil, averaging 3 inches high by 3½ broad; form, roundish oblate, slightly smaller at the apex than at the base, very regular; color yellowish, splashed with dull red on sunny side and streaked and with deep red dots small and distinct; stem, short, ¾ in. long, stout, in a large russetted cavity; calyx, large and very open, with short segments placed in a large, green cavity.

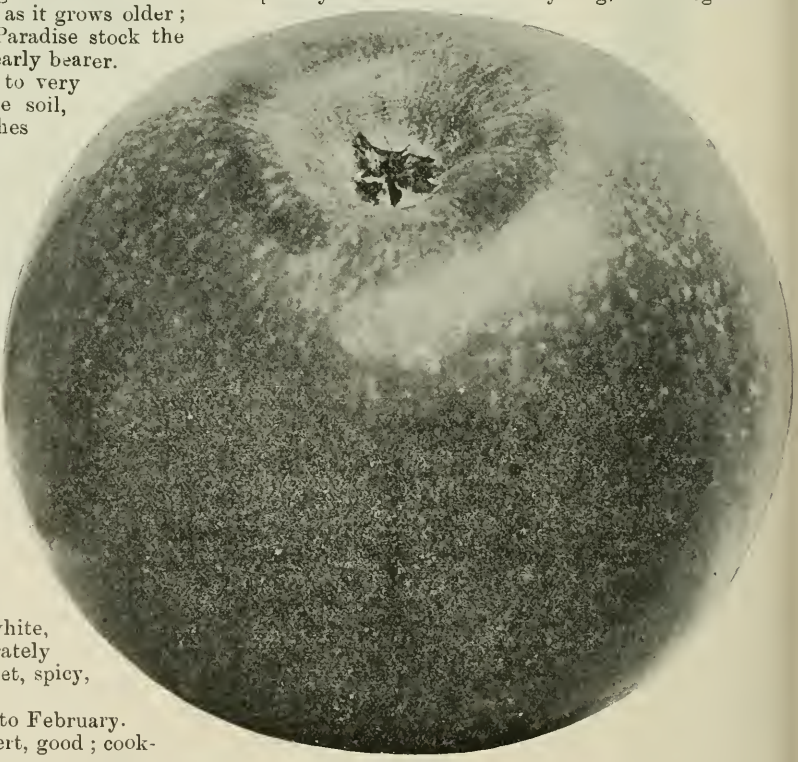
Flesh: Cream white, fine, crisp, moderately juicy; flavor, sweet, spicy, slightly acid.

Season : Nov. to February.

Quality : Dessert, good ; cooking, very good.

Value : Home and foreign markets, first-class.

Adaptation : Ontario, south of latitude 44½.



BLENHEIM.

FALL PIPPIN.

A general favorite as a fall cooking apple, and possessing a fairly good flavor as a dessert apple. It was at one time planted very freely, but of late years it has been discarded because of its liability to the apple scab.

Origin: America, probably from seed of Holland Pippin.

Tree: Habit, stout, vigorous, spreading; head round; longevity, some trees in Niagara district are now over 100 years of age; fairly productive.

Fruit: Large, $3\frac{1}{2}$ x $3\frac{1}{4}$ inches; form, roundish, sometimes obscurely ribbed; skin, yellow, often with red cheek and a few small grey dots; stalk, half to three quarters of an inch, set in a small, moderately deep cavity; calyx, small, open in a small, moderately deep basin.

Flesh: Greenish white; texture, tender, mellow, and fairly juicy; flavor, brisk, pleasant, aromatic.

Season: November and December.

Quality: Dessert, fair; cooking, very good.

Value: Home market, good; distant market, poor.

Adaptation: Hardy in the apple districts, but very subject to scab.

FALL PIPPIN.

GRAVENSTEIN.

A favorite commercial apple in Nova Scotia, but altogether too little cultivated in Ontario, considering its many excellent characteristics. It has no competitor it its season for either home use or market.

Origin : According to Hogg, the original tree grew in the garden of the Duke of Augustenberg, at the Castle of Grafenstein in Schleswic-Holstein in Germany, and was still standing about the year 1850. Leroy inclines to accept a statement by Hirschfelt, a German pomologist, who in 1788 wrote the first description of the apple, and stated that it was brought to Germany from Italy. The earliest trace of this apple we can find dates back to about 1760. It is now widely grown in Western Europe, and is a favorite everywhere.

Tree : much more vigorous in growth than ordinary varieties, and when in bloom remarkably beautiful with its extraordinary sized pure white blossoms ; hardy and productive.

Fruit : large to very large, the sample photographed was 3 inches long by $3\frac{3}{4}$ broad : form oblate conical, somewhat one sided and more or less pentagonal ; skin, greenish yellow to orange, beautifully striped and splashed with two shades of red : stem, stout, about $\frac{1}{2}$ inch in length, set in a deep, narrow cavity ; calyx partially closed, wide long segments, set in a wide irregular, slightly russet basin.

Flesh : White ; texture, crisp and very juicy : flavor rich, vinous and aromatic.

Season : September to October.

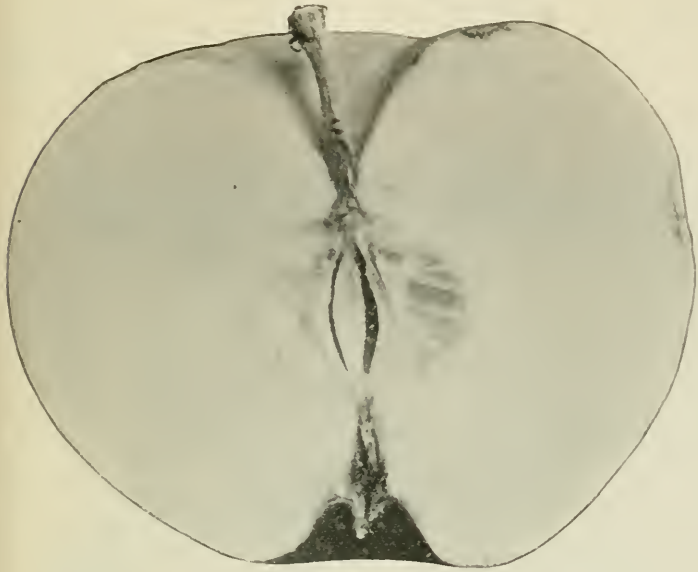
Quality : Dessert, very good ; cooking, first rate.

Value : Home market, first class ; foreign market, first class.

Adaption : General in the apple sections.

GRAVENSTEIN

PRIMATE.



A fine dessert apple for the home garden; too tender for distant shipment

Origin: Uncertain; probably Western New York.

Tree: Hardy, very vigorous, symmetrical, very productive.

Fruit: Above medium, 2½ inches long by 3¼ broad; form oblate conical; skin, light yellow, with crimson blush on sunny side; stem about one inch long, inserted in a large deep furrowed cavity; Calyx, closed in an abrupt, moderately deep, somewhat corrugated basin.

Flesh: Color, white; texture, tender, juicy, with a very pleasant, sub acid flavor.

Season: August and September.

Quality: Dessert, very good; cooking, good.

Value: Home market, good; foreign market, poor.

PRIMATE.

GRAPES.

JESSICA.

An excellent dessert grape for the amateur's garden.

Origin : Canada ; a seedling raised by W. H. Read of Port Dalhousie, introduced by Mr. D. W. Beadle of St. Catharines, and first described in the *Canadian Horticulturist* for February, 1884.

Vine : Fairly vigorous, hardy and healthy.

Bunch : Five inches long by 3½ inches broad, shouldered, compact.

Berry : Medium, ½ to ⅝-inch in diameter ; color, yellowish green to white ; skin, thin ; pulp, tender, juicy ; flavor sprightly, aromatic, sweet and very agreeable, free from foxiness.

Quality : Very good for dessert.

Season : Last of August.

Value : Market, too small ; home uses, very good.

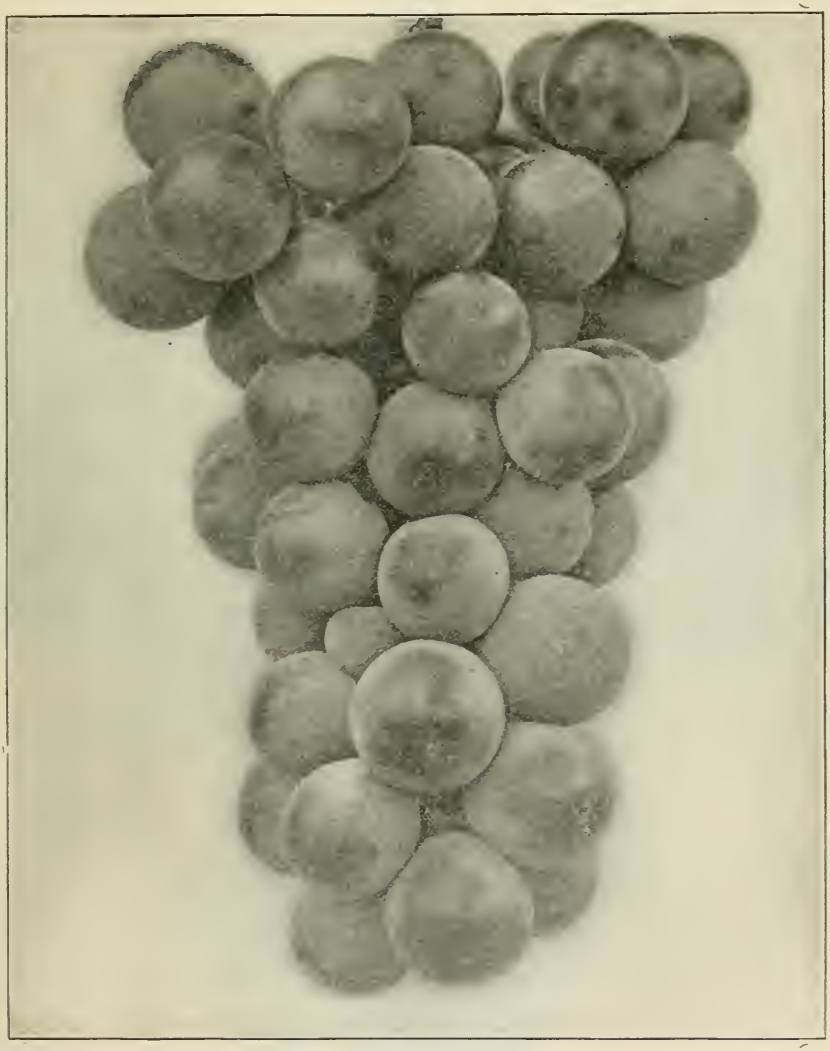
Adaptation : General.

JESSICA

WORDEN.

A seedling of the Concord, the Worden naturally much resembles that well-known variety indeed, the vines of these are almost identical in character and appearance.

When first introduced it was thought to be superior to the Concord as a market variety for the main crop, but it has proved to be superior only in its earliness, ripening a few days in advance of its parent. Otherwise, it is not equal to the latter, for its skin is more tender, rendering it unfit for distant shipment, while, if left hanging, it cracks open very badly, and at the the same time loses flavor.



WORDEN.

Origin : S. Worden, Minnettoo, N.Y., from Concord seed.

Vine : Strong, vigorous grower, with coarse stout foliage, dark green above, rusty underneath : very hardy, healthy and very productive, often yielding at the rate of three tons per acre.

Bunch : Large, compact, shouldered.

Berry : Large, black ; skin tender, thin, with heavy bloom, cracks easily ; flesh sweet when well ripened ; pulp tender, and loses flavor soon after ripening ; a poor keeper.

Season : Middle to end of September.

Quality : Second rate for dessert purposes.

Value : Second rate for near market and fourth rate for distant market.

Adaptation : Well suited to the northern sections because of its early ripening.

REQUA.

(*Rogers 28.*)

A fine table grape, supposed to be too late for Canada, but ripening well in the Niagara district. A sample of the kind of grape which should be grown for export, but the vine is

REQUA.

scarcely productive enough to be profitable.

Origin : E. S. Rogers, Salem, Mass.; a hybrid between the Wild Labrusca, or Mammoth Fox grape, of Massachusetts, and a European variety. Mr. Rogers produced his seedling in 1856, and at first introduced them by their numbers only.

Vine : Fairly vigorous and moderately productive.

Bunch : Large, shouldered, moderately compact, but somewhat poor.

Berry : Large, round ; skin thin, wine color with thick bluish bloom ; pulp, tender, juicy ; flavor, sweet, sprightly ; seeds, two or three, of medium size.

Quality : Dessert, very good. Value : First class for home or foreign market.

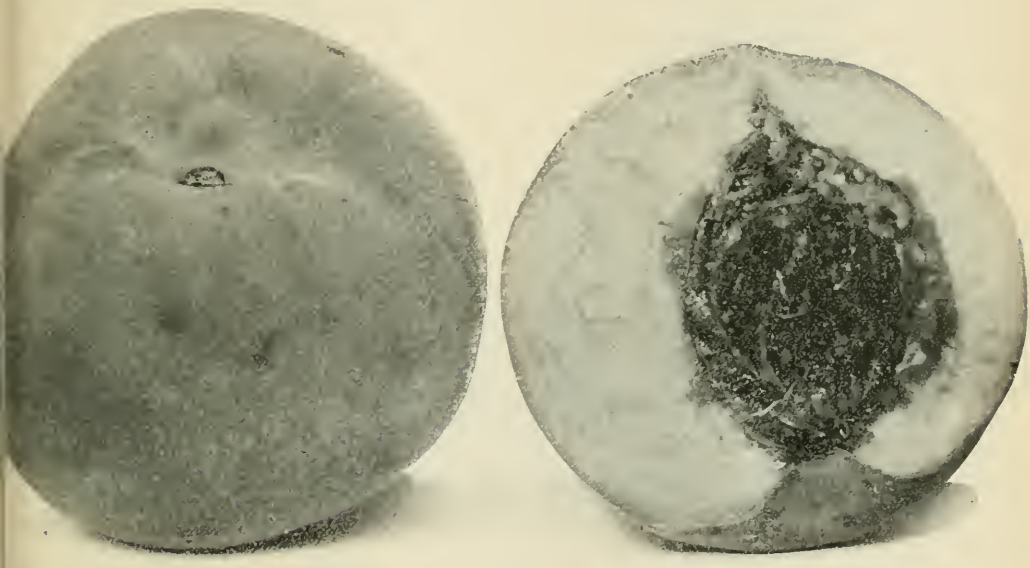
Season : September, October and November.

PEACHES.

CROSBY PEACH.

(Excelsior, Hale's Hardy.)

A peach of good quality, but not large enough for the commercial orchard.



CROSBY.

Origin : Massachusetts 1876, by Mr. Crosby, nurseyman ; named Excelsior by the Massachusetts Agricultural College ; Hale's Hardy because Mr. J. H. Hale was the first grower to plant it extensively, and finally Crosby by the United States Division of Pomology.

Tree : Vigorous, healthy, fairly hardy and very productive.

Fruit : Medium size, 2 inches to 2¼ inches in either diameter ; form almost round, slightly one sided ; color yellow, with bright red cheeks, very pretty ; cavity deep, abrupt ; apex small in a slight depression ; suture traceable.

Flesh : Color, bright yellow, red at the stone ; texture fine, moderately juicy, tender ; flavor sweet and very agreeable.

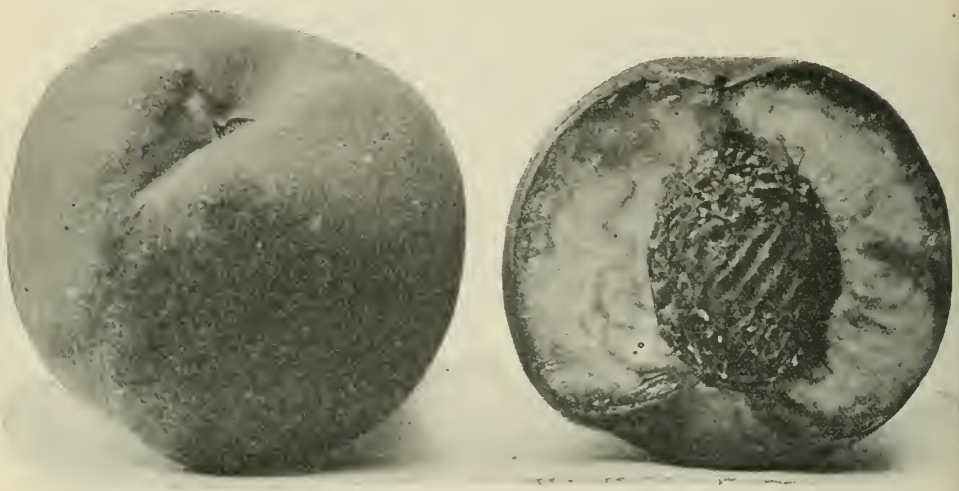
Season : September 29th to October 5th.

Quality : Very good for dessert, and good for cooking.

Value : Good for home market.

HYNES.

A very good early dessert peach, but the fruit is inclined to rot in wet seasons.



HYNES.

Origin : Introduced in 1895 by Mr. S. D. Willard of Geneva, N.Y.

Tree : Vigorous and productive, but somewhat subject to yellows.

Fruit : Roundish, slightly one-sided ; size, medium, about 2 x 2¼ inches ; color, greenish white with bright red cheek, sometimes deep red in the sun ; cavity, narrow and deep ; suture, distinct ; dots, numerous ; skin, thin and tenacious ; stone, semi-cling.

Flesh : Color, yellowish white ; texture, juicy ; flavor, sweet and agreeable.

Season : August 10th to 25th.

Quality : Dessert, good to very good.

Value : Home market, good ; distant market unsuitable.

SNEED.

A promising early variety for home use and near markets.

SNEED.

Origin : Tennessee, by Judge Sneed of Memphis, about 1880, from a pit of the Chinese Cling.

Tree : Vigorous, but slender in young growth, productive, an early bearer.

Fruit : Medium, about 2 x 2 inches ; form, roundish oval, slightly one-sided ; skin, light greenish white, with red cheek, and short thick down ; cavity, narrow and deep, with distinct suture, and a small pointed apex, in a slight depression.

Flesh : Semi-cling ; color, yellowish white at maturity ; texture, tender, fine, very juicy ; flavor, mild, vinous, pleasant.

Season : July 20th to 30th, 1900.

Quality : Dessert, good.

Value ; Home market, fair ; distant market, useless.

TRIUMPH.

A valuable commercial variety, to follow the Alexander, but not very popular on account of its heavy coat of down, its dull color, and its susceptibility to rot.

Origin : Georgia, seed of Alexander.

Tree : Vigorous, hardy, very productive, subject to twig blight and leaf curl.

TRIUMPH.

Fruit : Two inches long by 2½ broad ; form, roundish, somewhat shouldered and flattened ; color, yellow ground nearly covered with red and markings of very dark red ; cavity, deep ; apex, small, in a decided depression ; suture, distinct ; pit, semi-cling.

Flesh : Yellow ; texture, fine, juicy ; flavor, sweet, rich and excellent.

Season : August 15th to 20th.

Quality : Good.

Value : Home market, very good.

Adaptation : Michigan, Ontario and New York.

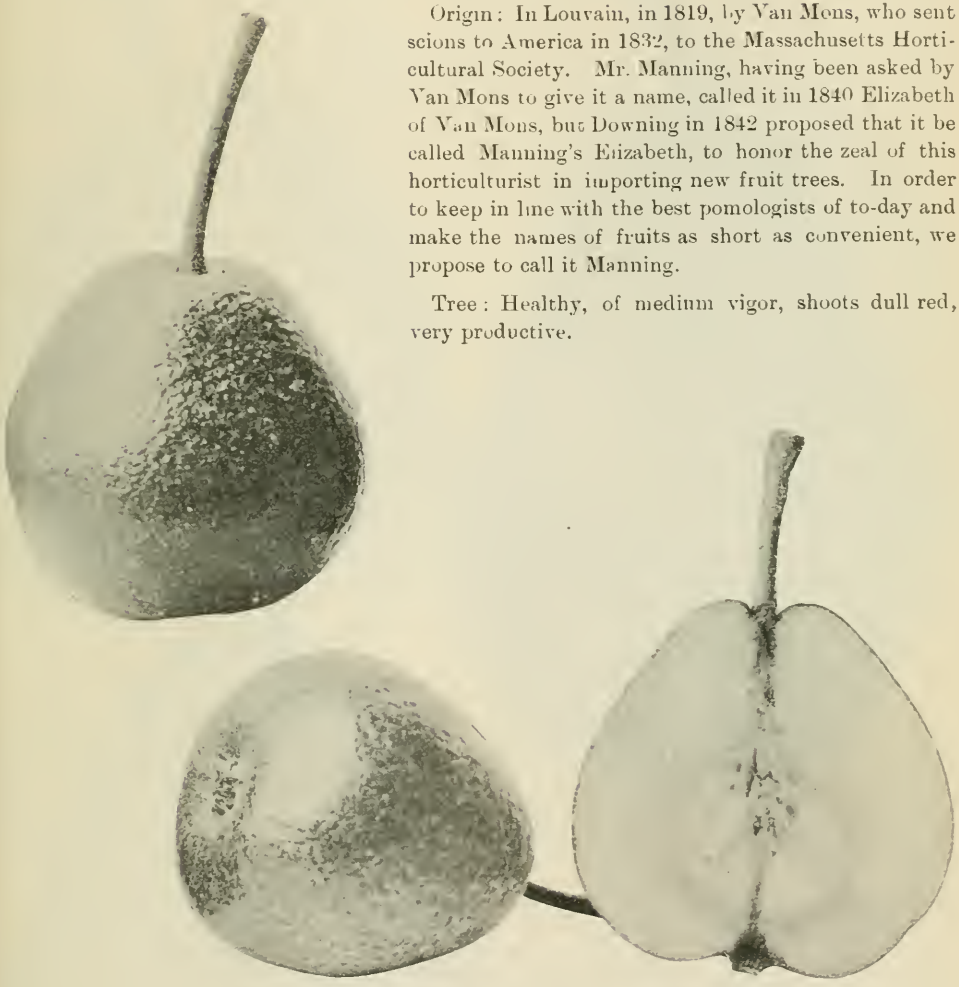
MANNING.

(Manning's Elizabeth.)

A pretty little pear, desirable in the amateur's garden, but too small for the commercial orchard.

Origin: In Louvain, in 1819, by Van Mons, who sent scions to America in 1832, to the Massachusetts Horticultural Society. Mr. Manning, having been asked by Van Mons to give it a name, called it in 1840 Elizabeth of Van Mons, but Downing in 1842 proposed that it be called Manning's Elizabeth, to honor the zeal of this horticulturist in importing new fruit trees. In order to keep in line with the best pomologists of to-day and make the names of fruits as short as convenient, we propose to call it Manning.

Tree: Healthy, of medium vigor, shoots dull red, very productive.



MANNING.

Fruit: Size, 2 x 2½ inches; form, regular, obovate, swollen towards the base; color, bright yellow, covered on the basal half with a deep brownish red, which often spreads over the sunny side; stem, one inch in length, swollen at the top, often set in an oblique depression; calyx open, set in a shallow basin.

Flesh: Color, creamy white; texture, fine, buttery, moderately juicy: flavor, sweet, rich, aromatic.

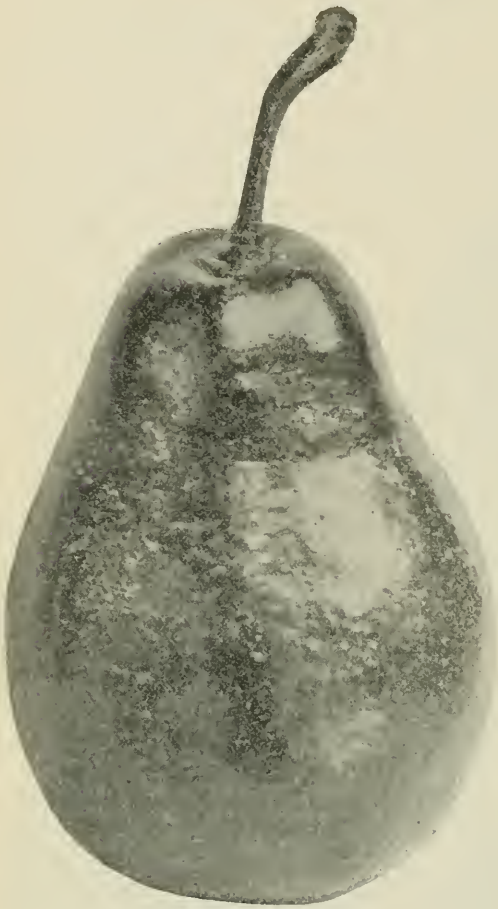
Season: August 15th to 20th.

Quality: Very good for dessert or pickling.

Value: Poor for market purposes.

LOUISE.

(*Louise Bonne de Jersey.*)



An excellent export pear if well grown. This and the Duchess have long held the first place as market varieties with growers of dwarf pears in Ontario.

Origin : At Avranches, France, about 1780, by Mr. Longueval, and named after Madame Louise de Longueval. About 1827, grafts were secured by Andre Leroy of Angers. The original tree is said to be still standing.

Tree : Hardy in southern Ontario, succeds better on quince than on pear stock ; a vigorous, upright grower ; very productive, if well cultivated and set in deep, rich sandy loam.

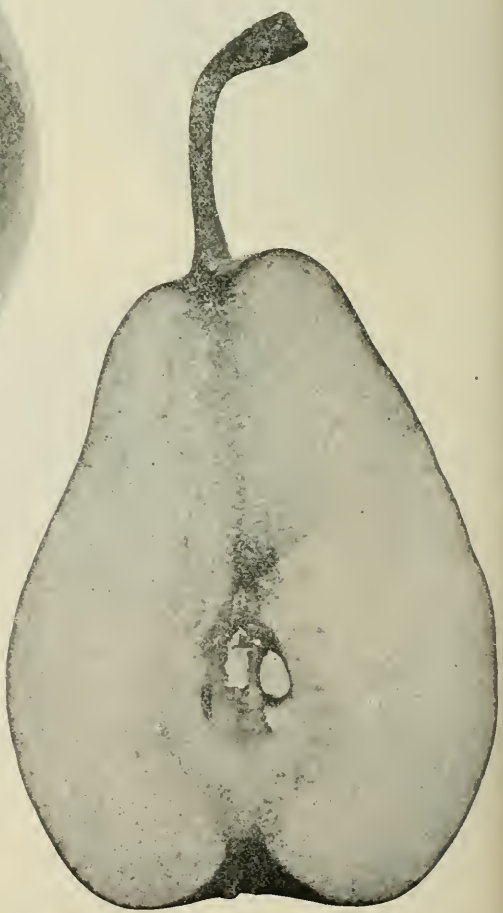
Fruit: Large, often $3\frac{1}{5}$ inches in length by $2\frac{1}{2}$ inches in width ; form, pyriform, sides usually unequal ; skin, smooth, yellowish green with brownish red cheek, with numerous red and brown dots ; stem, one to one and a half inches long, usually fleshy at insertion on one side, somewhat swollen at each extremity, set in a very slight, if any, depression : calyx, half closed, set in a wide, shallow, slightly plaited, basin.

Flesh · White ; texture, fine grained, juicy, buttery, melting ; flavor, pleasant, aromatic.

Season : September 15th to October 15th.

Quality : Very good for dessert purposes.

Value : Home market, fair ; foreign market, first class.



Louise.

BUFFUM.

BUFFUM.

Formerly this pear was much in favor as a profitable orchard variety, because of its productiveness and the wonderful hardiness and vitality of the tree, but of late years it is much ess in favoi with pear growers on account of its small size and ordinary quality. Some trees of this variety at Maplehurst, forty years planted, have never shown the slightest tendency to blight, and have attained a great height, more resembling Lombardy poplars than pear trees.

Origin : Rhode Island.

Tree : Remarkable for its vigorous, symmetrical, erect habit of growth ; it is regularly and fairly productive, but, unless gathered early, the fruit drops badly ; not subject to blight.

Fruit : medium size, obovate, slight oblong, sometimes $2\frac{3}{4}$ inches long by $2\frac{1}{2}$ inches wide ; skin, rough, yellow at maturity, with bright or dull red or russet on sunny side ; dots, small, brown ; stalk, $\frac{3}{4}$ inch long in a small cavity ; segments of calyx small, in a small basin.

Flesh : Yellowish white, crisp, not fine, not juicy, sweet with pleasant flavor.

Season : September.

Quality : Dessert, fair ; cooking, fair.

Value : Home market, poor ; distant market, very poor.

Adaptation: Counted hardy in Bruce and Huron counties; slightly tender in North Ontario county.

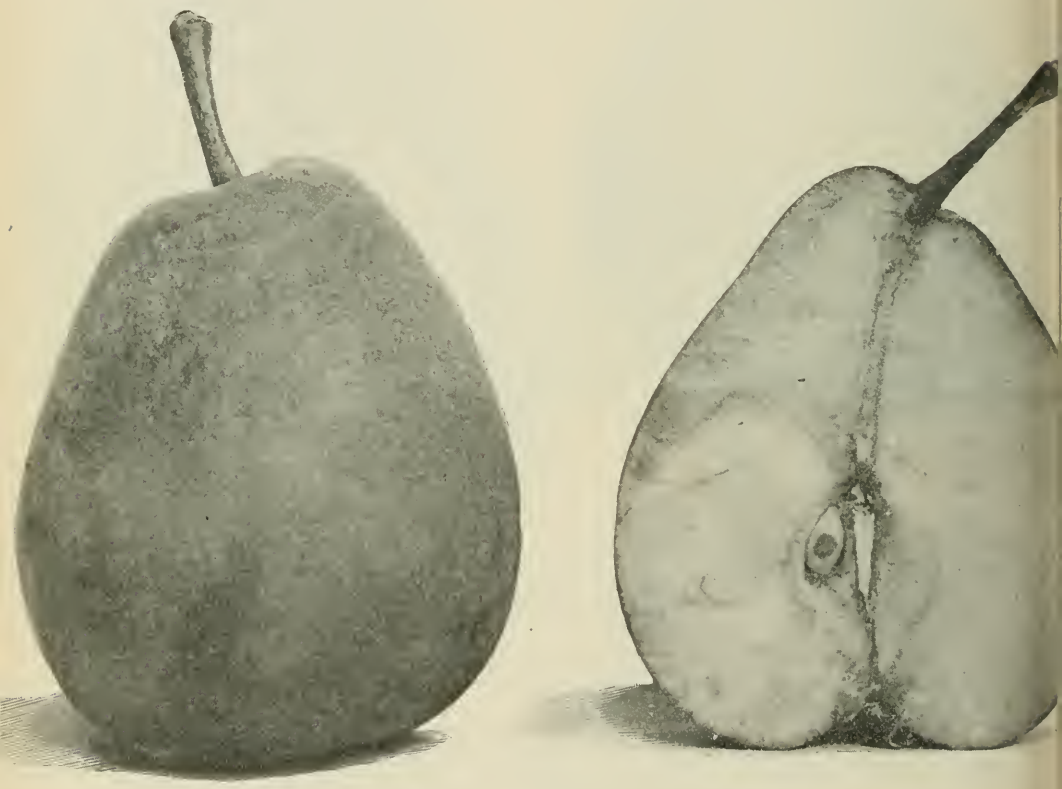
HARDY.

(*Beurre Hardy.*)

A good variety for the month of October, for both home use and market.

Origin : Boulogne, France, dedicated to M. Hardy, director of the gardens of Luxembourg, Paris.

Tree : Fairly vigorous and productive, and forms a fine symmetrical tree, especially when grown on the quince. The fruit is uniform in size and the skin is a bright clear russet.



HARDY.

Fruit : Average size, 3 inches long by $2\frac{1}{2}$ inches broad ; form, obovate, obtuse pyriform, of smooth regular outline ; skin, yellowish green, with numerous russet dots and covered with light brown russet, especially at the ends ; stem, about an inch in length, stout, with fold at the base, and inserted obliquely in a small depression ; calyx, large, open, in a shallow basin ; flesh, white, fine grained, buttery, juicy, with rich aromatic flavor.

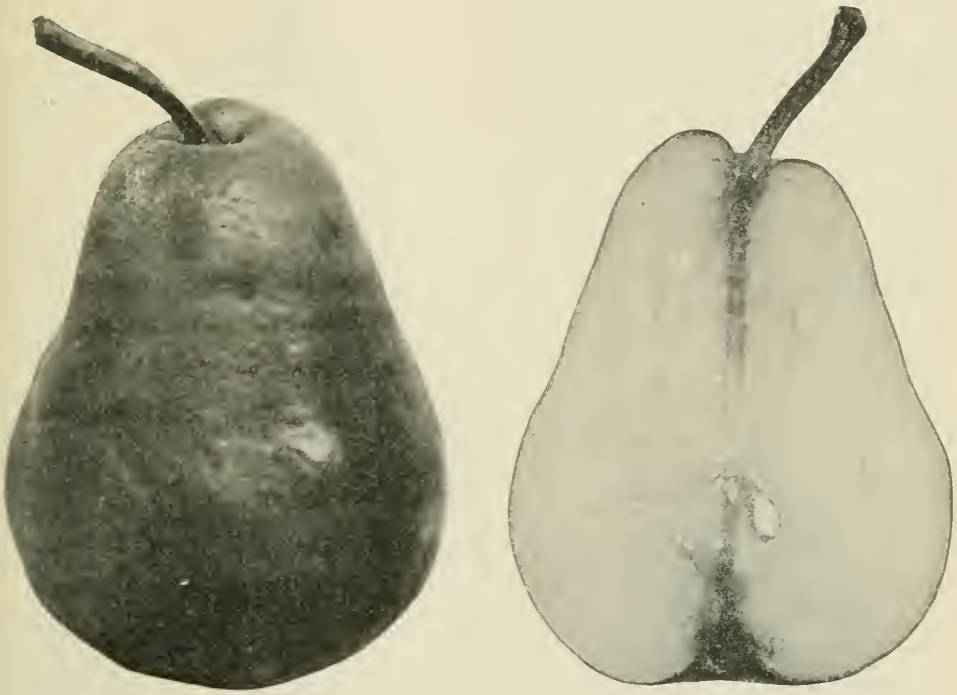
Season : October.

Quality : Dessert, very good ; cooking, good.

Value : Home market, good ; not yet exported from from Ontario, but exported with success from California to Great Britain.

WILDER.

A valuable early market pear, being beautiful in appearance, of fair size and very good flavor ; probably the best of its season, but inclined to rot at the core, if left hanging on the tree.



WILDER.

Origin. Chance seedling on south shore of Lake Erie.

Tree: Vigorous, very productive, and an early bearer when grafted on the quince.

Fruit: Fair to large in size, $2\frac{1}{2}$ to 3 inches in diameter ; form, ovate, obtuse pyriform, sometimes shouldered at stem , color, greenish yellow, with deep red cheek and numerous grey dots ; stem, stout, $\frac{3}{4}$ to 1 inch in length ; calyx, open.

Flesh: White, tender, fine grained ; flavor, sweet, aromatic and very pleasant.

Season: August 12th to 25th.

Quality: Dessert, very good.

Value: Home market, excellent.

VICAR.

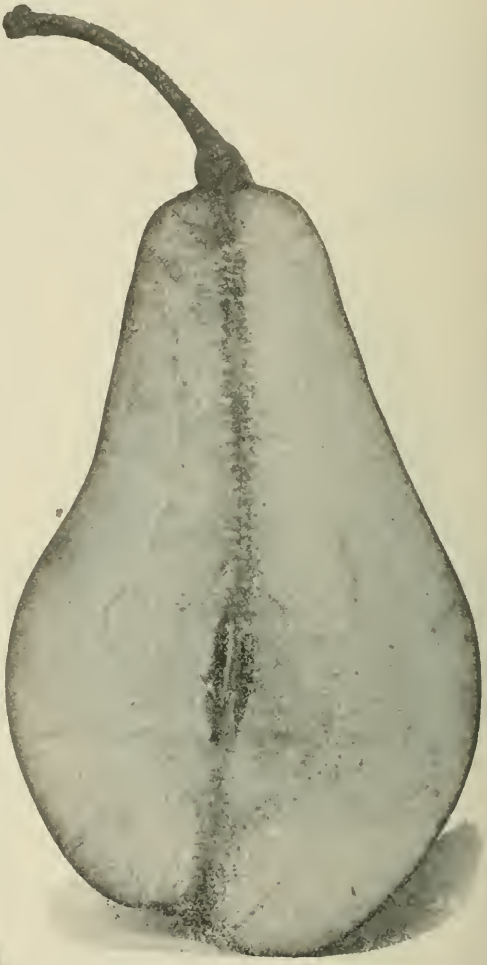
Vicar of Winkfield (Hogg); Curé (Leroy).

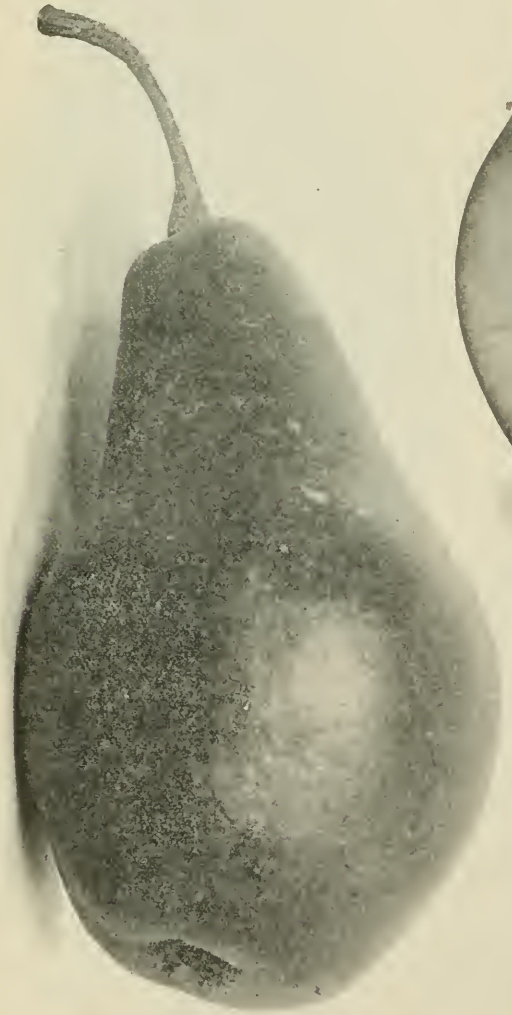
A French pear considerably grown in Ontario as a winter pear, but it does not reach its best perfection in our climate and does not deserve a place in our orchards.

Origin: Found wild near Clion, France, by M. Leroy, curate of Villiers-en-Brenne, in the year 1760; distributed in France under sixteen different names; introduced into England by the Rev. W. L. Rham, Vicar of Winkfield, in Berkshire, hence its English name.

Tree: Vigorous, but somewhat susceptible to blight, very productive.

Fruit: Large, sometimes reaching 4 inches long by 2½ broad, and in France it is claimed to reach 5½ inches long by 3½ broad; more often in Ontario it averages the size of our engraving; form, long pyriform, one sided; skin, green, seldom tinged with brown on the sunny side, and marked with small brown dots; stem, usually 1½ inches long, fleshy at base, and inserted obliquely without a cavity; calyx, open, with large segments, set in a shallow basin.





VICAR.

Flesh: Greenish white, firm, not very juicy as grown in Ontario; flavor, fair, if well ripened.

Season: December to February.

Quality: Dessert, very poor; cooking, fair.

Value: Home market, poor; foreign market, poor.

FRUIT EXPERIMENT STATIONS.

REPORT ON THE INSPECTION OF THE FRUIT EXPERIMENT STATIONS.

By Prof. H. L. Hutt, Ontario Agricultural College, Guelph.

Through the progressiveness of Mr. G. C. Creelman, Director of Farmers' Institutes, a series of Orchard Institute meetings was arranged for in various parts of the Province last summer, and wherever possible these meeetings were held at the Fruit Experiment Stations. I had the pleasure of attending quite a number of these meetings and giving talks on a few of the most important points in connection with orchard management. These meetings have helped greatly to bring the people of the sections where the meetings were held in more direct touch with the work of the stations.

Through the untiring efforts of W. L Smith, editor of the *Weekly Sun*, who attended every meeting possible, excellent reports were published in the *Sun* of each meeting, which, no doubt, helped greatly to widen the influence of station work generally.

As these orchard meetings were held during the early part of the summer, I found it advisable to visit some of the stations later on in the season when the varieties of fruits grown there could be studied to the best advantage.

The Burlington Station, A. W. Peart, Burlington, Experimenter: On May 24th, the first of the Orchard Institute meetings was held at the Burlington Experiment Station. Unfortunately the day was cold and wet, otherwise there would no doubt have been a large attendance. As it was, however, there were about one hundred present; and because of the unfavorable weather, the lunch and the programme of music and speeches which followed was entered into with extra zest. Between the showers, a walk was taken through the orchards and fruit plantations, all of which showed that they received first-class care and attention. Mr. Peart gave a practical talk on his methods.

On August 21st, I again visited Mr. Peart and found him very busy with his plum harvest. The trees were well loaded, and he would probably have about 2,000 baskets of plums. Pears also were a good crop, most of the trees of a bearing age being well loaded. Many of the young trees set out in the experimental orchard in 1896 and 1897 are now coming into bearing. The Wilder, a promising early variety, was in season at the time of my visit, and was of exceptionally fine appearance and excellent quality.

Scions of thirty-nine varieties of apples were sent to Mr. Peart for grafting last spring. These were worked upon bearing Roxbury Russets. Nearly every graft had been successful, and the scions had made good growth.

Young trees of six other varieties had been sent for planting, and have been put for the present in nursery rows. Of most of these there were from six to ten trees of a kind This is rather more than any of the experimenters should be asked to plant of an untested variety. At most three of a kind should be plenty.

Mr. Peart has put out another plantation of blackberries, in which all of the varieties sent for testing some years ago have been included. A lot of careful work has been done in testing currants, and the full results of these tests will be given in Mr. Peart's report.

The Simcoe Station, G. C. Caston, Craighurst, Experimenter: On June 6th, I attended an Orchard Institute meeting at Mr. Caston's. There were about eighty of the farmers of the neighborhood present, and much interest was taken in the work of the station. After a formal meeting in the hall on the place, Mr. Caston gave valuable information on the kinds of fruits he had found best adapted to that part of the country.

His orchards and fruit plantations were in excellent condition, and most fruits with the exception of apples, promised a good crop. The cherries, of which Mr. Caston has a good collection, were particularly well loaded.

The Bay of Quinte Station, W. H. Dempsey, Trenton, Experimenter: On June 12th, an orchard Institute meeting and basket picnic was held at our experimenter's, Mr.

W H. Dempsey, Trenton. About 200 people were present. After the lunch baskets had been emptied, an interesting and profitable afternoon was spent, in the fruit house and orchards, when such questions as cultivation, spraying, pruning, grafting, budding, etc, were discussed and illustrated. Mr. Dempsey gave a practical talk on the varieties he had tested, and mentioned those he considered best for home use, and those he had found most profitable for the foreign market.

The orchards were at that time in a fine state of cultivation. As in most other sections, there was promise of but a light crop of apples, although the Fameuse trees were making a good showing.

On October 12th, four months later, I again visited Mr. Dempsey and found him in the midst of his apple picking. He had picked about 450 barrels of Fameuse, and estimated his entire crop at about 1,000 barrels, not half his usual crop, still much above the average crop this year. The varieties making up the bulk of his crop were Fameuse, Seek-no-Further, Northern Spy, Roxbury Russet, Golden Russet, Ontario and Stark. His early apples were a good crop and brought excellent prices. Such varieties as Duchess, Astrachan, Trenton, Alexander, and Wealthy sold at $3 per barrel for first grade, and $2 65 for second grade fruit.

The young trees in the experimental orchard have made good progress and are coming into fruiting. Among the many new varieties which have been introduced into the older orchard by means of grafting, there are a number of quite promising ones which will be mentioned in Mr. Dempsey's report.

The East Central Station, R. L. Huggard, Whitby, Experimenter: On my way back from Trenton, June 12th, I visited Mr. Huggard's station at Whitby. The experimental trees at this station are in two separate orchards. The north orchard contains most of the young apple and pear trees planted in 1896 and 1897. This orchard had been well cultivated, and the trees were making a good growth The land between the trees was being cropped again with potatoes and roots. The south orchard contains the bearing apple and pear trees as well as the plums and some of the young pear trees. Owing to the wet season and scarcity of help, this orchard had at that time not been cultivated, although a coating of manure had been applied and plowing had just been started.

As elsewhere, apples were evidently going to be a light crop, although the pears and plums gave promise of a good crop. Many of the young experimental trees will be in bearing this year, and will probably be noted in Mr. Huggard's report.

The South western Station, W. W. Hilborn, Leamington, Experimenter: An excellent institute meeting was held at the home of Mr. W. W. Hilborn on the afternoon of June 14th. There were present about 60 or 70 of the fruit growers of that neighborhood, who showed their interest in the work by the active way in which various phases of orchard management were discussed. Mr. Hilborn gave valuable information relative to the varieties of peaches and plums he had already tested.

Since the severe frost of three years ago, when the greater number of the peach trees in this section were winter killed, there has been a great deal of replanting; but in many cases the trees have not made satisfactory growth. Whether this is due to the weakening of the trees from fumigation or severe winter weather has not yet been determined. Mr. Hilborn's orchards are well cared for, and what bearing trees he has left are looking well. The peach and cherry trees gave promise of only a fair crop, but the plums, particularly a number of the Japan varieties, were well loaded.

The Lake Huron Station, A. E. Sherrington, Walkerton, Experimenter: On June 18th, I visited Mr. A E. Sherrington, Walkerton, and addressed a largely attended orchard meeting. About 300 people were present, many having driven in from a long distance. Much interest was taken in looking over the orchards and in discussing the various questions regarding orchard management.

Mr Sherrington's orchards and small fruit plantations were all in excellent condition, and his trees were all showing great promise of a crop His apple trees were better loaded than any I have seen this year, and the young plum trees in the experimental blocks were particularly heavily loaded, and would require thinning. Good progress is being made at this station, and Mr. Sherrington will this year have excellent results to report.

THE GRIMSBY STATION, L Woolverton, Experimenter: It was arranged by the Director of Institutes that a series of orchard meetings should be held on June 20th, in the Grimsby section to visit the fruit farms of Mr. W. M Orr, E D. Smith, M. P., Mr. M. Pettit, Mr. L. Woolverton, and others in that section; but, unfortunately, heavy rains interfered somewhat with the plans. A small meeting gathered at Mr. E. D. Smith's in the forenoon, where after being hospitably entertained we were taken for a drive through the nurseries. The weather having cleared in the afternoon, the trolley was taken to Mr. Woolverton's, where a tramp was taken through his orchards and fruit plantations. Mr. Woolverton led in a running discussion on varieties, and methods of orchard practices as we went from one kind of fruit to another, and before the meeting dispersed he gave a practical talk on the packing and shipping of fruits for the Old Country market.

On Sept. 10th, I again visited Mr. Woolverton, and found him busy getting off an experiment shipment to Glasgow of two car-loads of Bartlett pears.

At this station is a great collection of all kinds of fruits that can be grown in Ontario, from which Mr. Woolverton is gleaning notes for his descriptive and illustrated work on the "Fruits of Ontario." His young experimental orchards of cherries, plums, peaches, and dwarf pears are now nicely into bearing. On account of the exceptionally wet spring, there was not as good a crop this year as usual.

THE GEORGIAN BAY STATION, John Mitchell, Clarksburg, Experimenter: On June 25th, another orchard meeting was held at the fruit farm of our experimenter John Mitchell, Clarksburg. The meeting was well attended, many of the most prominent fruit growers of that section being present. The orchards were inspected, and a profitable discussion was held upom the various methods of orchard practice. Mr. Mitchell's orchards are a sight well worth seeing. He has about 150 varieties of plums now in bearing, and gave his experience as to those he had found most profitable, and what he considered the most promising of the new ones. There was promise of a good crop of fruit in both the apple and plum orchards, and Mr. Mitchell will no doubt be able to give a valuable report upon some of the newer varieties of plums.

THE SIMCOE GOOSEBERRY STATION, Stanley Spillett, Nantyr, Experimenter: This Station was visited July 12th, about the best time to see the bushes in fruit. No regular meeting has been arranged for at this point, but the indefatigable editor of the *Sun* and a number of the neighbors were present to learn what was being accomplished.

Mr. Spillett's crop of gooseberries was much better this year than usual, as there was much less mildew on the English varieties than has been for several years. There was enough, however, to show that these varieties cannot be depended upon. The American varieties—Champion, Downing, Pearl, and Red Jacket were all free of mildew and heavily loaded with fine fruit. Whitesmith and Green Chisel were making the best show among the English varieties. Mr. Spillett's plantation is well cared for, and he is propagating largely his best varieties.

THE ST. LAWRENCE STATION. Harold Jones, Maitland, Experimenter: An orchard Institute meeting was held at this Station on June 12th, the same day as that held at Trenton; for this reason, I could not be present. The meeting was in charge of Mr. H. Jones and Prof. W. T. Macoun, of the Central Experimental Farm, Ottawa.

I visited Mr. Jones on Aug. 29th, and found his orchards in their usual good condition. Last year his bearing orchard, mostly of Fameuse and Scarlet Pippin, produced about 750 barrels. This year the crop would not be more than half of that, but was much better than the average in most parts of the Province. Great difficulty was experienced in getting spraying done last spring, owing to the frequent rains, but all bearing trees were sprayed four times and were fairly free of scab. The trees not bearing were sprayed but once, and on these the foliage was badly affected with the fungus.

In the young experimental orchard, quite a number of the early bearing varieties are beginning to bear. Some of the trees known to be of inferior varieties were grafted to better sorts, and in all his grafting Mr. Jones has been very successful.

The plum and pear trees are on the whole not doing so well as the apples evident that quite a number of the varieties under test will be unsuitable for th Some varieties, however, promise well, and will be mentioned in Mr. Jones' report. About 160 young apple trees were set out last spring.

All of Mr. Jones' trees received good attention, his method being to cultivate thoroughly the early part of the season, and to follow after midsummer with a leguminous cover crop.

The Wentworth Station. M. Pettit, Winona, Experimenter: Mr. Pettit's vineyards and orchards were visited Sept. 10th. He happened to be away at the time judging fruit at the London exhibition, so that I did not have a chance to talk over the work with him.

As usual, however, at this station everything has been kept in good condition, and excellent opportunity is now offered for the study of varieties. As mentioned in last year's report, comparatively few of the many new varieties of grapes tested here have proven worthy of more extended trial. After a full report this year, Mr. Pettit might well be allowed to pull out or graft over all varieties in his experimental vineyard that are clearly shown to be not worth growing.

There are about forty varieties of plums and a number of peach trees being tried at this station, and nearly all of these trees bore an excellent crop this year. Many of the varieties have turned out not true to name, and Mr Pettit will have quite a task ahead of him getting them all identified and properly labelled.

I thought it was hardly necessary to visit this year the plantations of our strawberry experimenter, Mr. E B. Stevenson, or the "Pioneer Farm" at Dryden. At the former, Mr. Stevenson procures all his own plants, and his excellent reports are always forthcoming.

At the "Pioneer Farm," Dryden, Mr. Annis could have done little more this year than make another start with the stock sent to him.

The Algoma Station, at Richard's Landing, St. Joseph Island, was visited last summer by Mr. Orr, one of Board, who will no doubt be willing to give us a full account of what he saw. In a letter received from Mr. Young, our experimenter there, he referred to quite serious winter killing of the trees, which had been experienced last winter, due to the wet season and late continued growth of the trees the previous fall.

VISIT TO ALGOMA STATION.

I visited the Algoma Station on the farm of Mr. Chas. Young, at Richard's Landing, on Aug. 23rd.

The location of the experimental plot is excellent, and the care, including cultivation, good. However, a root crop which was growing in the orchard was rather too close to the trees to give them every chance.

The winter of 1900-1 caught fruit trees of all kinds in that locality in full foliage, and with wood immature. As a consequence some trees were killed, especially cherries, plums, and pears. Some of the Japan plums, e. g., Abundance and Burbank, however have a little fruit this season.

Eight varieties of crab apples planted by Mr. Young, prior to the establishment of the experimental station, were well loaded with splendid fruit. Duchess of Oldenburg, Wealthy, Scott's Winter, Fameuse, and Gideon were bearing a good crop of fine apples.

Summer and fall fruits grow in abundance and of excellent quality, but there is felt the want of a good winter apple to take the place of Spy, Baldwin, and Greening, which will not do well so far north.

Mr. Young has a seedling just coming into bearing, which is a strong vigorous grower with heavy, rich foliage. The fruit is green, of medium size, fair quality, and promises to be a good keeper.

W. M. Orr

GENERAL NOTES BY EXPERIMENTERS.

Algoma Fruit Station.

Apples There are now in test at this station twenty-two varieties of apples, grafted on the root, besides several other varieties top-grafted, principally on Talman and Longfield stock. The fall of 1900 was very trying to young fruit trees. The warm, moist

growing weather continued right into winter; in fact experimental trees went into winter still growing. As might be expected, this caused a larger percentage of loss than there would have occurred if the wood had ripened up well. A few of the trees planted in 1899 bore slightly this year, viz, Longfield, Scott's Winter, and Wolf River. Trees were protected by a strip of cedar bark bound to the trunk; a few, by way of experiment, received a thick coat of wash compound of soft soap and wood ashes. I think possibly this is as good a protection against sun scald in the spring as any other, besides being a permanent benefit to the tree. The following are the losses during the winter of 1900 and 1901:—Blenheim Orange, three; Sweet Bough, three; Red Bietigheimer, two; Red Astrachan, two; Rolf, two; Stark, three. Several of these however were killed by being girdled by mice. You will see that the hardy varieties suffered equally with the more tender kinds, so that the loss sustained was not to be accounted for by the tenderness of the tree but by the condition in which it went into winter.

The apple crop in bearing orchards this year was rather above the average both for fall and winter fruit. Every year some new variety is coming to the front and proving just a little better than anything we had before; for instance, Golden Russet has taken the place of Scott's Winter, and Longfield bids fair to take the place of our old stand-by Wealthy. I have seen several specimens of Ben Davis, but it will have to improve vastly in size and appearance to be worth anything here. Among Crabs we have nothing better than Martha and Hyslop. I still find there is more money in Duchess than in any other apple, and the supply is not equal to the demand yet. The curculio, from which hitherto we have been free, has made its appearance this year, not to any extent certainly, but still it is here now and will doubtless increase

CHERRIES have all done well. They are healthy and are making a good thrifty growth Several of them planted in 1899 fruited this year. From experience, such as I have had, English Morello and Montmorency are the most satisfactory. There has been no loss among cherries, except two which were girdled by mice.

PEARS are doing better than I expected. The trees are thrifty and making satisfactory growth. Just how they will do when they come into bearing I cannot say; meantime I would not recommend extensive planting.

PLUMS. At the risk of disagreeing with preconceived opinions I must still maintain that Japans are better suited to our northern climate than the Europeans I have no trees give me more satisfaction in watching their growth and handsome appearance than Japan plums. I would not like to say that they are all alike hardy. I do not think they are, and perhaps in another year I will be able to say which have done best with me. Several have fruited this year, and all came through the winter well. I have fifteen varieties under test

All trees have received clean cultivation; roots and small fruits are grown between the rows; the trees are sprayed in the experimental plot principally to keep down the aphis. Bearing trees in the old orchard are sprayed with Bordeaux and Paris green. I find that in the formula usually given the quantity of Paris green is not quite enough to produce the desired effect; $\frac{1}{3}$ more, using plenty of lime, would I think be better.

STRAWBERRIES. Of nine varieties under test, Clyde is the best. The crop this year was enormous. All were satisfactory except Saunders, which on my ground is worthless. They are grown in a matted row, and one crop taken off and then plowed under. I am unable to give the yield, and can only say they were the best crop of strawberries I ever saw.

RASPBERRIES have not done so well. Here again my experience is at variance with the majority of others, as Cuthbert has not done at all well; it is altogether too tender; the canes kill too far back. Loudon is much better, in fact the best so far. Black Caps are of no use. The weight of snow broke the canes off by the ground. I have twelve varieties under test, and I cannot say that any have brought a decent crop to maturity. I have planted a few rows on different soil which may do better.

BLACKBERRIES. Of ten varieties, Agawam has so far proved the best, but I would not care to recommend any one here to plant them. Perhaps the best use I could suggest would be a row inside the fence of the apple orchard; it might help to keep the little boy pest down.

CURRANTS AND GOOSEBERRIES have done very well. Between Downing and Pearl there is very little difference; either is better than any of the English kinds. Among

the six varieties of currants I cannot say that any one is the best, but all do well if the bush is kept open and well manured. Perhaps Cherry and Versailles are as good as any, but all are perfectly hardy

Grapes I have eight varieties, and they have done better this year. A few imperfect bunches were produced. Only the early kinds are of any use here, at least nothing later than Concord, and although it may color, even that will not ripen fit to eat every year.

Chas. Young.

Bay of Quinte Station.

The season opened with promises of a good year; not a heavy show of bloom, but fair, and as the bud was bursting, on came heavy rain, together with a cold wave, which lasted for many days, and this no doubt caused a very light set of apples. Plums were out of bloom, hence a fair crop; also some of the pears set well.

The wood growth has been good on all, and formed a good showing of fruit buds for next year.

Of the plums that fruited this year Burbank paid the best, as it ripened its fruit before the Brown Rot came on. Of some varieties not a plum ripened; they were all destroyed by Brown Rot. Abundance was good, but there were only a few plums of it. Gold, planted 1898, had a few plums; they looked the most attractive of any, but are of little value when you taste them. Wickson also had a few, which were fine.

Of the pears, Dr. Jules Guyot is the most promising. It resembles the Bartlett in form and color; ripe first week in September; it is not as good as Bartlett in quality; very productive. Duchess Precoce is a heavy cropper, but very poor quality; ripens after the Bartlett. Idaho bears good crops, and of good quality, similar in form to Sheldon. Two Keiffer trees, planted in 1895, bore five pecks each of fine large pears, and have made the largest growth of any of the pear trees. The peach trees have made a fine growth each year, and have a good showing of fruit buds at present; they have not been killed back yet.

Cherries were a light crop; there were very few except Early Richmond; the buds of the others failed to come out well.

Many of the new apples are very disappointing. They have fine names, but are very deceiving when you get the fruit. It is too bad that they were ever placed on the market, and some of the varieties are hard to distinguish from the older varieties, such as Peter, which is very much like Wealthy, but said to keep longer. I have seen no difference yet; even the trees are also similar. Western Beauty is also much like Wealthy, but a little earlier. Yates' Red is too small for this section Green Fameuse spotted badly, and is very unattractive, not keeping any better than the Fameuse; it is of nearly the same flavor The Winter Fameuse is small, spots badly, and not so attractive as the Fameuse. The Boiken and Winter Banana are very fine winter apples, of excellent quality, and heavy bearers; will give satisfaction to those who grow them for their own use. Their color may be against them for the market, as they are the color of the old Maiden's Blush.

Sutton Beauty, Rome Beauty, York Imperial, Missouri Pippin, and Gano are, no doubt, going to make good winter apples for the commercial orchard; all are attractive red apples, good, early and abundant bearers, and will likely take well in the markets.

W. H Dempsey.

Burlington Fruit Station.

Apart from apples the general fruit crop here was good. Prices also were fair, leaving a reasonable margin of profit. Owing to the frequent rains during the late spring and summer all sorts of bushes, vines and trees have made a strong growth. During the fall, however, a drouth set in which will tend to mature and harden the young wood, and thus prepare it for the winter.

The experimental fruit plantations are generally in a healthy, growing condition. A new plot of experimental blackberries was planted last spring. Apples were probably the lightest crop on record in this locality. The quality, too, was rather below the mark. The canker worm and tent caterpillar, as well as the codling moth, were in evidence. Spraying twice with a strong solution of Paris green thinned out the former. For the

tent caterpillar, crushing the nests when small by hand is, I think, the best remedy. Strict attention in the use of burlap bands, appears to be the most effective way of checking the codling moth or apple worm.

Of varieties, the Duchess for summer, the Ribston and Blenheim for fall, and the Baldwin Spy and Greening for winter, seem to take the commercial lead.

Southern Apples. Seven varieties of southern apple trees, one year old, were planted in a nursery row, viz : Dyer, Collin's Red, Richardson Russett, Rengen Red, Olivet, Apple of Commerce, Black Ben Davis. Of 9 Collin's Red, 2 only are living. All the other varieties are living and have made good growth. Apple scions of 39 other varieties from the south, were top grafted into 4 Roxbury Russet trees, 23 years old. The scions reached here late in the season, but probably three fourths of them took the sap and have grown very well. These are the varieties :—Belmont, Gilbert, Vandevere Pippin, Gill's Beauty, Carter's Blue, Little's Red Winter, Coffett Ingram, Monmouth Pippin, L S. Pearmain, Cullesago, Red Belleflower, Pennsylvania Red Streak, Wandering Spy, Huntsman, Milam, Highfill, Rebel, Blue Pearmain, Kentucky Tolmstein, Houseley's Winesap, Payne's Gatekeeper, Wythe, Malinda, Ozark, Nickajack, Red Limberton, Bonum, Black Warrior, W. C. Limberton, Swaar, Minnesota Pippin, Kentucky Red Streak, Lou, Magnum Bonum, Keeper, Ramsdell's Sweet, Hatchet's Seedling, Yellow Horse.

Pears were a fair crop of good quality. There was less blight than there has been for several years. The Beurre Giffard, an early August pear, gave a heavy crop of fine fruit The Wilder also an early pear, while not so productive as the Giffard probably leads in quality. Both of these varieties promise well.

The French pears planted in 1900 have all lived and made a good growth.

Plums were a very heavy crop. There was considerable rot however, especially on the Lombard, Reine Claude, H. R. P. Egg, and Yellow Egg The Japan varieties were practically exempt from this trouble. Of the domestic plums grown here the Quackenbos was the most satisfactory, giving a heavy crop of saleable plums.

The Lombard, Yellow Egg, Bradshaw, Niagara, Imperial Gape, Reine Claude, Quackenbos, and Staunton, with the Japan varieties, Burbank and Abundance appear to be the leading commercial varieties here. Saunders and Moore's Arctic both promise well for early plums.

Peaches were a fair crop. The following experimental varieties planted here in 1897-98 bore some fruit this year : Champion, tree a strong, vigorous grower; fruit, large to very large ; roundish-conical, of good quality, a cling-stone Season, last of August, promises well.

Crosby, tree a vigorous grower, fruit medium, roundish-conical, yellowish red, of good quality.

Longhurst, a moderate grower, fruit medium size, oblong-oval, yellow flesh, skin yellowish-pink. A free stone of good quality. Season, middle of September.

Tyhurst. Tree a moderate grower ; fruit small, yellow flesh and skin, of good quality, a free stone.

The other varieties have not yet fruited.

Cherries were a good crop of excellent quality.

Grapes were a heavy crop. Some of the red varieties, such as the Delaware and Agawam, shed their leaves prematurely thus retarding their ripening. The Wilder (black) also defoliated early. The Eaton, a large black grape and a new variety here, does not seem to be productive. Massasoit, one of the Rogers early red grapes, is growthy and productive and promises well. It ripens with the Worden. The Moyer is a failure, too much wood and not enough fruit. Of the grapes grown here the Worden is probably the most satisfactory. It is growthy, hardy and very productive. There was practicably no mildew on any of the varieties, and they are going into winter in good condition.

Raspberries were a fair crop. Prices were exceptionally high, the first I sold bringing 20cts. per quart in Montreal. Of the red varieties Marlboro', Cuthbert, Loudon and Miller take the lead in the order named, while in black, Smith's Giant, Kansas and Older, stand at the head ; Columbia still ranks first in the purple, and Golden Queen in the yellow. Some of the tips of the Cuthbert canes were frozen last winter, but that is exceptional here.

A. W. Peart.

East Central Fruit Station.

In submitting my Annual Report for your approval, I have confined the varieties to those sent me by the Board of Control, as you desired, with the exception of plums and grapes. Those I have included in report, have all fruited one or two years, and some oftener, and are as nearly correct as I could make them, without giving a written description of each.

In Apples, the Western Beauty, which has fruited here for three seasons, is the most perfect specimen of any apple I have grown, although only a late fall variety. I will send you it. For a late winter, I have none that surpasses the Salome for bearing, good color, and keeping qualities; besides it is a heavy and regular bearer.

In Pears, the Keiffers take the lead for bearing this season again, although Compte de Paris is about equal, and is superior in size, color and quality. There were several varieties sent me for trial which are of no use, being too small for commercial purposes and too shy bearers for profit. In compiling my notes on cultivation, growth, and profit, for the time the trees have been planted, I find the following varieties the most profitable for this year, viz.:

In Apples. 1st, Salome; 2nd, Minkler and Boston Star being equal; 3rd, Northern Spy; 4th, Golden Russett.

In Pears, the first for yield was: 1st, Keiffer's Hybrid, and for age of tree Compte de Paris was a good equal; 2nd, Clapp's Favorite, 3rd, Bartlett; 4th, My New Seedling although B. Clairgeau, Lawrence, and Belle Lucrative yielded good crops.

In Plums, considering the age of trees, the palm must go to Burbank, but the largest yield was from Quackenbos, which yielded 23 and 27 12 quart baskets, respectively, from two trees Many other varieties did well. Very few plums were stung by curculio, but owing to damp weather some few rotted, but not to any great extent. I attribute to the spraying with Whale Oil Soap and Bordeaux Mixture, in a large measure, the cleanness of our fruit, as the last spraying was done after the fruit was well formed, and some of the plums were one third grown. We sprayed all our trees four times, the first being done as the buds began to swell.

For some reason, which I have not been able to discover, many of our apple trees did not have a blossom and consequently no fruit. This was not confined to any one or two varieties, as, for instance, one Baldwin had about three barrels of fruit, while seven others did not have a bushel; the same applies to Spys, Russets, and others.

The growth of wood this year has been wonderful, and many of our oldest trees have made more wood growth than for many years past, the foliage of almost every tree has been a healthy, vigorous color during the entire season, and the wood and buds seem to be well ripened.

Taken altogether, our orchard appears to go into winter quarters in a good shape.

Most of our orchard ground was simply cultivated at intervals, while we grew about two acres of young orchard in root crop, after applying about twenty loads of barnyard manure per acre, which, I think, improved the young trees; but after this year we propose simply cultivating the ground without a crop.

I sold my apples to a shipper for $3 00 per barrel to go to Winnipeg.

R. L Huggard.

Georgian Bay Fruit Station.

This season has been rather disappointing as to information on new varieties of plums. Although nearly the whole plantation produced a heavy and most beautiful bloom, only a comparatively few varieties bore heavy crops, and these were the self-fertile kinds, such as Lombard, Reine Claude, Tatge, Saratoga, and all the Gages, together with several varieties of Japan plums, such as Abundance, Burbank, Chabot, Hale's Japan, Orient, Red June, and Satsuma. All of these varieties bore abundant crops, some of them much too heavy. It will be remembered how wet and cold the weather was all through blossoming time, which no doubt prevented the wind and the bees from scattering the pollen. Even the curculio could not get in its work, and we had no harm done by it this season. This was also apparent in the apple orchard as only two or three kinds are bearing heavily, such as Greening, Russet, and Snow.

Where thorough and systematic spraying with Bordeaux mixture, together with good fertilization and cultivation, are carried on, the apple scab seems to be a thing of the past as we have had none for years. One could not find a basketful in fifty barrels, while in orchards near by, which are neither sprayed or cultivated, the fruit is almost worthless.

CHERRIES have done fairly well this season except a few trees that were slightly injured by the aphis, which no doubt lessened the quantity and quality of the fruit. We are beginning to find we can grow a good many of the better varieties of cherries almost as well as the common red. English Morello, May Duke, Montmorency, Windsor, Olivet, etc, even the thought-to be-tender Yellow Spanish trees are quite promising; having been planted only three years they have already fruited twice.

GRAPES have done remarkably well, carrying immense loads through to maturity. We are now fruiting successfully here such varieties as Champion, Niagara, Salem, Delaware, Worden, Rogers' No. 4, Brighton, Moore's Diamond, Pocklington, Vergennes, Green Mountain, etc., wintered on the trellis

Strange it may seem, but probably too good to last, this season has been a great surprise to us in peaches. Everything on the station grounds, that was old enough, bore a full crop, almost to breaking down, while in neighboring orchards, where trees were not so well headed in, they were actually broken to pieces. Young Fitzgeralds were a pretty sight to see, drooping to the ground with their load of large, high colored fruit. Triumph, Tyehurst and Bowslaugh have fruited now for the third season in succession, and seem to stand the winters as well as plums.

CULTIVATION. We have grown no grain or grass crops in our orchards for several years, and would about as soon think of doing without the orchard as growing farm crops in the bearing orchard. In order to conserve moisture we cultivate, or plow if necessary, in the spring as early as possible, work it down fine, and establish a coat of dust or soil mulch as it might be called. We keep it there till the middle of July or first of August; then cultivation should cease. We have followed this to good advantage by sowing red or crimson clover. It will take up the surplus moisture, and will tend to hasten the better coloring of the fruit, and also the more mature ripening of the wood.

JOHN G. MITCHELL.

GOOSEBERRY TESTING STATION.

I beg to submit the following report of my station for the year 1901:

PRUNING. All varieties of gooseberries gave the largest crop of the largest fruit I have ever had. In my opinion the larger berries were due to more severe and continuous pruning than usual. Last fall the bushes were cut away to six stems and the head thinned by one third. On the 15th of May all suckers except those needed for renewal were cut away, and the head again thinned by cutting away the new wood. This new wood was cut close to the stems as shortening induces the growth of much slim wood.

Fall pruning has just been completed for next year's crop, and consists in the cutting away of all branches from the six stems one third the way up the stem in addition to what was done last year. So trimmed, each stem has the appearance of a little tree.

Red Jacket, Pearl, etc., were noticeably larger, while Champion, not spring pruned, was no larger than usual.

SPRAYING. Two sprayings were given before the leaves came out, with bluestone water, two pounds to 25 gallons of water. Liver of sulphur was used for the remainder of the season. At first sprayings were made every eight days and after every heavy shower. Mildew made its appearance, just little specks upon the berries, on the 6th of June. and by the 14th half the fruit was covered. Spraying was continued, care being taken to wet every part of the bush. The result was that the disease went no further after the 14th and the berries were injured apparently only in appearance. Mildew generally makes its appearance upon the young, tender leaves and shoots of the plant; this year neither have been affected by the disease. Our first spraying with bluestone will be made this fall.

FERTILIZERS USED. A good dressing of stable (horse) manure was given in 1899 followed in 1900 by ashes. This season the bushes were mulched with about half an inch of good hard wood ashes. This fall stable manure will be dug in between the rows.

Cultivation has been scuffling between rows, and between and working under the bushes very shallow by hand with a good sharp, long handled shovel.

Fruit Falling In the earlier part of July the fruit of most of the American varieties commenced falling badly as usual, but not so badly as last year. I at first attributed this falling to an egg being deposited by a fly or a moth, but after careful observation I am satisfied it is caused largely by lack of moisture in the soil

Plums. Japan plums, set three years, not a twig killed so far; Wickson, very vigorous, all gave a few plums, large, good; Abundance and Burbank, both vigorous fruit, larger than Lombard; Willard, very vigorous, fruit large and showy, earliest of all, valuable here. Lombard, 12 years from graft, grafted just above the ground from the old Green Gage, sprayed with Bordeaux, did not lose a plum. At least half the Lombards in this section rotted. Japan did not rot even where not sprayed. Yield 13 full 12 quart baskets at 50 cents per basket.

Strawberries.	Williams, two rows 200 feet long, yield			450	qts. at	7½c.
	Sadie,	"	"	too small.. 100	"	7½c.
	Clyde,	"	"	50	"	7½c.
	Glen Mary,	"	"	50	"	7½c.
	Edgar Queen,	"	"	40	"	7½c.
	Saunders,	"	"	35	"	7½c.

Clyde burned up after first picking.

New strawberry beds—Plants 1½ feet across, solid wall each side runners; have been cut five times; have added William Belt, Haverland, Van Deman, Nick Ohmer, Michael's Early, Green's Big Berry, Woolverton, Gandy, and Splendid. All are carefully labelled

Raspberries. Columbian gave half a crop, but made a splendid growth of canes, 2 q's. to hill at 8⅓ cts, $2.00 for 24 qt. crate.

Shaffer gave not half a crop, made fine canes, 1½ qts. to hill at 8⅓ cts. Best berry for home use and market, too, if people learn to know them.

Cherries—1 doz Dyehouse 3 years planted gave a nice little crop of beautiful fruit. This tree must be either a cross of Ostheim or some variety of the kind, I judge, from the peculiar marking of the bark.

50 Ben Davis and Pewaukee apples set 2 years ago have made almost phenomenal growth.

Pears Clapps Favorite set 10 years gave a dozen large beautiful pears. Flemish Beauty, set at the same time, no fruit yet. Keiffer 3 years set gave 1 dozen each, but they are yet as hard as a rock. Clairgeau 3 years set makes very little growth.

S. Spillett.

Lake Huron Fruit Station.

I am pleased to report that the work carried on at this station during the past season has given satisfactory results. Very little planting was done. Last spring only one variety of plums were sent to this station, but the manager of his own accord planted four varieties of peaches, three varieties of pears, and three of currants Another plantation of raspberries was set out of nearly all the former varieties at first planted. The manager of this station has every reason to be thankful for this season's crop, for on the whole it has been a good one. The yield of apples was not quite as heavy as two years ago but heavier than last year, and of much better quality, especially the Spys, which were very fine. Some of the newer varieties of apples commenced to bear, and nearly all the varieties of plums fruited, also most of the cherries. All of those varieties that gave sufficient fruit for picking will be mentioned in the notes. The winter of 1900 and 1901 was a very mild one, the lowest degree of frost being 13 below zero, and that occurred on the 13th of December. All the plants and trees came through in first class condition with the exception of the Cuthbert raspberry, which was damaged to some extent owing to a late growth in the fall, and the early frost in December.

Notes:—May 1st. Sprayed plums with Bordeaux.

" 10, 11 and 13th. Sprayed apples.

" 12th. Had cold rains with snow.

" 24th. Heavy rains all day turning colder in afternoon, temperature at 7 p. m. 36 degrees.

During the latter part of May the green and black aphis appeared in great numbers.

June 1st. Sprayed peach, plum, and apples for green aphis, cherry for black aphis, and rose-bush for thrip, with Mystic Spraying Compound; this mixture is a tobacco preparation, and it was most useful in clearing the trees of all that classes of insects. *Codling Moth* was rather more numerous than usual. *Fungi* in its various forms was conspicuous by its absence this season, very little of any form being noticed.

A. E. SHERRINGTON.

MAPLEHURST FRUIT FARM.

The cherry harvest is becoming much more important than it was a few years ago, when cherry trees were planted only in waste corners. Now a good many are planting acres of single varieties and making a business of wholesale shipments. The black aphis is a most troublesome insect enemy of the cherry trees, not only checking the growth, but also disfiguring the fruit and preventing it from ripening. It must, therefore, be vigorously fought on its very first appearance by a thorough spraying with kerosene emulsion, or with kerosene and water mixture, for which some pumps are now adapted. It is much easier of application than the emulsion and more economical. Some say that five per cent. of kerosene is strong enough for the aphis, but so far we have not satisfied ourselves on this point.

The best package for the cherry, in our Canadian markets, is scarcely a settled question. We have been using two sized baskets at Maplehurst, one holding about twelve Winchester quarts, and the other six, and for choice cherries we have found the small size the best. These are covered with a wood and leno combination cover, showing the fruit to purchaser without its removal. We do not face the package with any finer fruit than is found throughout, but we lay the top layer so as to hide the stems, which makes them much more attractive in appearance. We never think of shipping our cherries as they come from the trees, because they are mixed with leaves, poor cherries, etc. We bring them to a packing table, pour them out and repack so that our purchasers will get only first-class fruit.

The picking is usually done by men, especially in our old orchard where the trees are high and long ladders are needed. In the younger orchards, however, where the trees are smaller and can be reached by step ladders, we often employ women and girls, and find them excellent pickers.

In the packing house we employ women, for it is a work they enjoy, and they do it with excellent taste.

In the large cities we see the California cherries offered for sale in shallow boxes, holding about two layers, the top beautifully placed in regular rows, without a stem to be seen. Our engraving (from the Fruit Trade Journal,) shows a cherry packing house at San Jose, California, where the fruit is being put in these boxes. (See page 5)

The size of these boxes is, outside measurements, 18 inches in length, $10\frac{7}{8}$ inches in width, 3 inches in depth. Inside measurement, length $16\frac{1}{2}$ inches, width $10\frac{3}{8}$ inches, depth $2\frac{1}{2}$ inches. The capacity is 10lbs. of cherries.

It is an open question whether it would not be an advantage for us to adopt this package for our choice cherries.

Refrigerator cars have proved of great service to our fruit growers, enabling them not only to reach cold storage steamers with fruit for export, but also to reach the home markets with tender fruits in far better condition and at less cost than by express. The immense quantities sent forward from the Niagara district, for example, at one time so congested the service of the express trains that the goods were handled most carelessly. Now we can load a refrigerator car at leisure and forward by fast freight to such a centre as Ottawa or Montreal, and have confidence in the safe arrival even after a journey of forty-eight hours.

A great mistake is often made by over-loading such cars. The hot air is driven to the top, so that there should be a space over the goods of about two feet, and besides this, there should be a space of $1\frac{1}{2}$ or 2 inches between the packages for the free circulation of the cold air. For want of attention to such provisions many large shipments have arrived in bad condition, and the car blamed for what was really the fault of the shipper.

The Bordeaux Mixture. Early treatment with this remedy for fungi of all kinds should be faithfully persevered in, if the best results are to be obtained, always remembering that it is a prevention rather than a cure

The lime and copper sulphate solution should be made separately, with about half the amount of water required for each. Then the copper sulphate solution should be poured into the lime water, stirring vigorously all the time; never reverse this operation.

L. Woolverton.

St. Lawrence Fruit Station.

The winter of 1901 proved severe on some varieties of fruit trees and buds. There was a good covering of snow from Nov. 23rd to the last week in March, and in the orchards where there was a cover crop the ground was not frozen. The injury seemed to be the result of a late growth of wood and buds not fully ripened. The temperature during the winter months was normal and steady.

The first eight days of May were moderately warm, with frequent showers, which brought most fruit trees into bloom. From that date to June 10th it rained nearly constantly, making the ground so wet that grain seeding and general farm work was at a standstill, and spraying was done under great difficulties. The blossom was poorly fertilized and the young fruits drooped badly, making it one of the lightest crops we have had in years.

Where four sprayings were made fruit was 75 per cent. clean, but throughout this section spraying was generally neglected, and fruit proved worthless in such cases.

All fruit trees in the experimental orchard have made a good growth of wood and have developed fruit buds in many cases.

The cover crops of red clover are thick and heavy, and will afford ample protection to the roots during the coming winter.

Field mice are so numerous and the cover crop so heavy that I am protecting all young trees with tar paper as a precaution against injury.

Harold Jones.

Simcoe Fruit Station.

This season has been, on the whole, one of the most favorable for most varieties of fruit that we have had for several years, although the apple crop was much below the average. Other fruit (with the one exception of raspberries, which were injured by winter killing and again by the extreme heat of July at time of fruiting) were a good crop. The winter of 1900–1 was the mildest for several years, 20 below zero being the coldest dip we had. The fruit buds came through in good shape, and there was a great profusion of bloom on all fruit trees. The partial failure of the apple crop was no doubt due to a cold east rain that prevailed for two days just at the time the blossoms on most of the trees were about to shed their pollen. This cold rain washed off the pollen and prevented the bees from working. Much of the fruit that did set seemed to lack vitality and dropped early, soon after forming. In my own orchard the Spys and Ben Davis, which bloom later, set and matured a good crop. The plums and cherries bloomed early and in fine sunny weather, and were a fine crop and of best quality. Strawberries were good, though shortened to some extent toward the last by dry, hot weather. Raspberries were the nearest to a total failure in my experience. They were simply cooked and dried up by the fierce heat of July. Rain came in time to save the blackberry crop, and the fruit was very fine. Most of the young cherry trees were well loaded, and the fruit was the best in quality I think I have ever seen. The same may be said of the Japan plums. Five trees of Burbank, four years planted, yielded thirty-six baskets and the plums were of fine quality.

None of the experimental stock has failed this year, except one or two of the French pears. Everything receives clean cultivation, is properly pruned and sprayed, and presents a healthy, vigorous appearance.

Raspberries Cuthbert, the best red variety in point of quality of all the varieties tested here, is not a profitable commercial berry. There is too much loss of bearing wood by winter killing, especially after a fine open autumn. They continue to grow so late

the wood is not sufficiently ripened, and they kill back nearly to the snow line. Loudon and Miller seem to be hardier, but do not sucker freely, and are slow in propagation. Golden Queen is a poor market berry, as it goes off in appearance very quickly after picking. The hot, dry weather of July played havoc with the raspberry crop this year.

Strawberries The best all round strawberry I have tested here in the last five years is the Williams. It is a healthy and vigorous plant, stands the drouth well and carries its size well through the season. Its chief fault is its white tip. The old Crescent is still the greatest yielder. Clyde is a large, healthy plant, and the fruit is large but pale in color, and there is not much left after the second picking if the weather is dry. The advent of the perfect strawberry is still in the dim and distant future.

Blackberries After a trial of thirteen varieties there are two that I have no hesitation in recommending for this section of country. They are the Agawam and Eldorado. These are both hardy and healthy and bear a fine crop every year. The Eldorado is not so productive as the Agawam nor does not sucker as freely, but the fruit is larger and a little better in quality. These two have given excellent satisfaction and I am greatly pleased with their quality

Nursery agents have been selling blackberry plants through this section for several years, and recommending varieties that they knew nothing about, with the result that people were about discouraged with trying to grow blackberries at all. They would make a fine growth of canes during summer, but in spring they would be dead down to the snow line, and they were minus the bearing wood, and of course could produce no fruit; but these two varieties may be planted with every assurance of success.

Some people reading this report may say, "What about the Snyder, it is a hardy variety." Yes it is, and I used to grow it, but I don't now I wanted something hardy enough for this section and of a good deal better quality, and I have got it.

G. C. Caston.

South-western Fruit Station.

Peaches were about an average crop. The quality, however, was not quite up to the usual standard in most varieties. This was the result of the very dry weather which prevailed during the whole of the ripening period, together with the injury caused by the severe frost of February, 1898. Here and there trees still continue to die from the injury received at that time.

The trees came through the past winter in good condition, very few blossom buds injured. The spring was cold and backward which is usually conducive to "Curl leaf;" the injury from that cause was not great, however.

The experience of another season goes to show the growing importance of selecting the best varieties for orchard planting. We must study the requirements of the people, and try to put on the market the class of fruit wanted But very few white-fleshed peaches are required at the present time for market purposes. They are in some demand for home use, but about nine out of every ten prefer yellow sorts At our own table we are learning to think more and more of the white-fleshed kinds. When planting for commercial purposes it is very important to select the best varieties that will ripen in succession to cover the whole season. Dealers want fruit every day. If you cannot supply them, they will look elsewhere for their supplies.

Too many of the Alexander or early clingstone class have been planted. They injure the sale of good fruit when first offered, as consumers are afraid of getting clingstones and do not buy readily for some time after the good freestone sorts are on sale.

The following varieties are named in their order of ripening and contain the cream of the list that have been tested at this station: Triumph, St. John, Garfield, Early Crawford, Fitzgerald, Yellow Rareripe, Engle Mammoth, New Prolific, Elberta, Bronson, Crosby, Golden Drop, Smock, Salway. The latter will not ripen except in favorable localities. These sorts will give a succession from the first ripening good variety to the last, and cover the whole of that period without interruption.

Japan Plums are receiving a good deal of attention at the present time. They no doubt hold a very important position among our fruits. They are not of as good a quality as the European varieties, therefore will not displace them. They are very rapid

in growth, bear young and abundantly, and several of them ripen just enough in advance of the European sorts to make them valuable for market purposes. Of those fruiting at this station I have been most favorably impressed with Red June, Abundance, Burbank and Satsuma. The latter is a blood plum, and the best for canning purposes of any of the Japan type; we prefer it to most of the European varieties. Red June, Abundance and Burbank ripen before most of the European sorts, on this account and their productive habits will be profitable to plant for market.

Wickson is the largest of the type, and its handsome appearance will make it valuable for market, should it prove vigorous and productive on a more extended trial. This season the ends of the branches blighted badly on many of the trees.

Berckmans is very much like Burbank in appearance, but not of as good quality and ripens later.

Chabot resembles Abundance, not of as good quality and ripens later.

Hale is of large size, good quality and fine appearance, but unproductive on trees five years planted.

Ogon is of such poor quality that it is not desirable.

I hope to be able to give a more extended report on Japan plums next season.

W. W. Hilborn.

APPLES.

Notes by W. H. Dempsey. (*Bay of Quinte Station.*)

Whinnery. Top grafted 1893; very slow grower; wood small, inclined to droop; foliage medium; fruit $2\frac{1}{4}$x$2\frac{3}{4}$, roundish, conical, skin greenish yellow, nearly covered with crimson; numerous large, gray dots; calyx nearly closed, set in a broad, moderately deep basin; stem $\frac{3}{4}$ inch, slender, set in a medium cavity; flesh white, firm, not very juicy; mildly sub-acid, good. Season, February to April.

Acher. (Illinois seedling.) Top grafted 1894; strong grower, heavy wood; foliage, large, heavy, good; fruit, 2x$2\frac{3}{4}$ inches, regularly formed; roundish, oblate; skin smooth, yellow streaked and splashed with red; calyx large, nearly closed, set in a wide, uneven basin; stem $\frac{3}{4}$ inch, set in a moderately deep cavity; flesh white, sub-acid, not so juicy as the Duchess, which it resembles very closely, but it will not keep as long. August-September.

Gravel Pippin. Top grafted 1894, medium grower, foliage medium; fruit 3 x $2\frac{1}{4}$ inches, round, conical; skin golden yellow, nearly covered with light red, with splashes and streaks of a darker red and numerous small gray dots; calyx open, set in a broad, even basin; stem $\frac{5}{8}$ inch long, slender, set in a narrow, deep, greenish cavity; flesh white, fine grained, mild, pleasant, sub-acid, core small. January-March.

Green Fameuse. Top grafted in 1894, made good growths, foliage medium; fruit $2\frac{1}{2}$x$2\frac{1}{4}$ inches, roundish, conical; skin yellowish white, with a few green dots; calyx nearly closed, set in a narrow, furrowed basin; stem $1\frac{1}{4}$ inches long, slender, set in a deeply-inserted cavity; flesh white, very tender, juicy, similar to Fameuse. October-November.

Yates' Red. Trees planted in 1897; a very good grower; fruited two years; foliage good; fruit 2x$1\frac{3}{4}$ inches, roundish, conical; skin greenish yellow, nearly covered with dark red, with numerous small gray dots; calyx closed, set in a broad, uneven basin; stem $\frac{3}{4}$ inch, slender, set in a russet cavity; core large; flesh, greenish white, fine grained, crisp, sub-acid. March-May.

Isabella. (Seedling of S C. Willson, Whitby.) Top grafted in 1895, vigorous grower, heavy foliage; fruit 3x$3\frac{1}{4}$ inches, roundish, oblong, much narrower near the calyx; skin lemon yellow, with crimson next the sun, with numerous dots; calyx partly closed, set in an uneven basin; stem $\frac{3}{4}$ inch, medium, set in a broad, green cavity; flesh white, tender, juicy, mild, sub-acid; core large; season, October-November

NOTES BY R. L. HUGGARD. (*East Central Fruit Station*)

America Quality, medium; fruit, round, red, and firm. December and January.

Belle of Boskoop. Hardy; fruit, large, round grain with russet dots and splashes; quality, equal to R. I. Greening; flesh, solid, yellowish white, good flavor. January-April.

Bethel. Growth, 22 inches; fruit, medium to large, dull color, fair quality, coarse flesh, medium bearer. January.

Ben Davis. Fruit, medium to large, beautifully colored, very solid flesh and a long keeper; quality, poor.

Bismarck. Fruit, large, nearly round, very handsome; flesh, a little coarse grained; good quality. January and February.

Cayuga Red Streak. Fruit, very large, nearly globular; flesh, coarse; good flavor; skin, green, smooth, half-covered with red splashes; productive; rather tender. November and December

Clayton. Tree and fruit resembling R. I. Greening but more upright habit; hardy and productive. January-March.

Cranberry Pippin. Vigorous; growth, 20 inches; fruit, large, smooth, mostly covered with red, somewhat flattened; yellow flesh; quality, good; productive and hardy; a good shipper. January-April.

Duchess of Oldenburg One of the hardiest and best of our fall apples. September and October.

Gano Fruit, medium to large, inclining to oblong; skin, yellow with blush on sunny side; flesh, white: quality, fair. November and December.

Longfield. Very straggling grower, hardy and productive, requires thinning, smooth skin, yellow with a bright blush; fruit, medium, oblong; flesh, white and juicy. December

La Rue. An early and prolific bearer of large dark red fruit; nearly round; skin, smooth, heavily dotted with areole spots; quality better than Baldwins; solid flesh and good shipper. January-April.

Lacey. A small handsome apple of excellent quality for export.

Mann. Hardy; fruit, smooth, green, nearly covered with whitish dots, medium to large size; good quality. January May.

McIntosh. Fruit, large beautiful red; skin, smooth; quality, good; flesh, white and juicy. January.

Ontario. Four years planted, 33 fruits, growth 23 inches; fruit, medium to large, flattened, yellow and red; quality, excellent; rather a slow grower but healthy and an early and abundant bearer; will pay for high cultivation.

Peter Hardy; not yet fruited; a rapid grower.

Red Bietigheimer. Very vigorous; 32 inches this season; 4 years planted; 9 fruits of the largest size; skin, smooth, flesh-coloured; flesh, fine-grained, white and juicy; ripe October 5th. Season, October and November.

Red Canada Four years planted; yield, 12 quarts; tree vigorous; growth, 21 inches; fruit, medium to large; skin, covered with dark red and numerous brown dots; flesh, very firm; medium bearer and quite hardy; a good shipper. January-March.

Salome. Rather slow grower; fruit, medium to large; of a beautiful yellow skin, mostly covered with carmine; skin, smooth and glossy; flesh, solid and white; good quality and productive.

Sutton's Beauty. Slow upright grower, 17 inches this season; rather delicate; not yet fruited here.

Stark. Growth 36 inches; the most vigorous of any tree in the orchard; fruit medium to large, mostly covered with red; a good shipper; quality, very good. January-April.

Scott's Winter. Rather slow grower; four years planted; growth, 17 inches this season; fruit, medium, slightly russeted, good flavor. February and March.

Tetofsky. Four years planted; bore a few samples; rather slow grower; hardy; fruit, large, yellowish green, rather acid till fully ripe. September.

Russian Transparent. Fruit, very large, light golden yellow; skin, smooth; the best early variety. July and August.

Russian No. 277. A regular grower of large fruit; skin, dark green turning yellow at maturity, red cheek on sunny side; fruit, inclined to oblong; flesh a little coarse; flavor, good. October and November.

Russian 230. A rapid grower, three years planted, nine inches growth; upright stalk; large dark foliage; fruit, resembling Duchess of Oldenburg, but three to four weeks later.

Russian 161. Fruit, medium, roundish yellow with red cheek; skin, smooth; flesh, white and juicy; an abundant bearer; hardy. November and December.

Wealthy. A beautiful apple; hardy and vigorous; an abundant bearer; fruit, medium to large; smooth skin; flesh, white, often veined with red. October and November.

Walbridge. Fruit, round; skin, smooth and green, half covered with red splashes; medium size; fair quality. December and January.

White Winter Greening. Medium sized fruit; smooth green skin; flesh, white, of fair quality. February and March.

Wolf River. Four years planted, 15 samples; fruit, medium to large, flattened, yellow with a red blush; flesh, white, firm and good. December and January.

Wellington. Fruit, medium, round; mostly covered with red; flesh, coarse, sprightly. December and January.

York Imperial Fruit, large, dark red; thick skin; flesh, white, moderately juicy, firm, good.

Yellow Newtown Pippin. A slow spreading grower; medium foliage, not yet fruited.

These are mostly the new varieties that fruited this season.

All our trees were sprayed four times and some five times, with the result that we had very few stung or wormy fruit, and no spots or scales on any except Fall Pippins which were only sprayed twice, and many of them had spots on them. The Codling Moth was very much in evidence early in the season, but seemed to get other fields of operations later on. Our trees all look ready for winter before much frost came, and the fruit buds seem well developed.

Fruit of all kinds sold well this season, so the growers got fair returns in this vicinity.

Notes by A. E. Sherrington. (*Lake Huron Fruit Station*)

Apples. Notes on a few of the new varieties that have commenced to fruit.

Bismark. This is a very handsome apple in appearance; fairly vigorous and apparently hardy; fruit, large conical; color, nearly covered with red, smooth and clean; has a very fine appearance; bloomed May 20th, four years old.

Barry. A very good grower, seems hardy; fruit, rather small; ribbed color yellow; not very promising; bloomed May 20th, four years old.

Peter. Tree rather peculiar in its growth, the limbs on the west side of tree trying their utmost to get on to the east side of tree; fruit, medium to large; color, nearly all red; resembles Wealthy; bloomed May 28th, four years old.

Gano. A very good grower, hardy; fruit, small to medium; color, red; resembles Ben Davis; bloomed May 20th.

Wine Sap. Tree spreading, hardy, vigorous; fruit, small; color, red; quality, good; bloomed May 20th, four years old.

Yellow Transparent. Tree, fine, upright grower; foliage, large, healthy and hardy; fruit, large; color, waxy yellow and quality very good; bloomed May 18th, four years old.

Pears. As none of the young trees have fruited yet, I am unable to give much of a report; a few more varieties were added this season. The *French Pears* received a year ago, are doing well, also all other varieties.

Notes by Harold Jones. (*St Lawrence Fruit Station*)

The experimental apple orchard was manured with barnyard manure and planted to corn for husking, leaving a space round each tree of 6 to 7 feet.

All the trees came through the winter in fair to good condition, and have made a strong, healthy growth during the season. The only new variety planted this spring was Wismer's Dessert. The following varieties are top worked and growing well: Mammoth Black Twig, Wine Sap, King, Cox's Orange Pippin, and the true Canada Red, as supplied me from Quebec through Prof. Waugh, of Burlington, Vt., which differs from the Canada Red that is grown here.

Some of the varieties planted in 1896 have borne a few specimens this year.

Chenango Strawberry. Fruited this year for the first time. The tree makes a slow, feeble growth with a close round to spreading head; small, light green, thin foliage. The fruit is of medium size, oblong, conical; color, light yellow streaked with bright red; flesh, tender breaking, mild, sub-acid, good, free from spot. Season, September-October. Not likely to prove of value in this section

Longfield. Has fruited for the third time. Tree a moderately vigorous grower of drooping habit; foliage healthy, light green with grayish cast; a heavy and early bearer; fruit, small to medium, conical; skin, yellowish with pale blush on sunny side; flesh, white, tender breaking, juicy, mild, sub-acid, pleasant. Season, October-November. Not a good apple for shipping and hard to handle for home market.

Ontario. Has fruited for the second time. Tree a medium grower, making a compact spreading head; foliage, healthy and abundant; fruit 3x2 inches, oblate; skin, greenish yellow shaded with dull read; flesh, white, tender, acid. Season, December-February. Gives promise of being valuable as a shipper and market variety. Some young trees, one year old, showed injury by sunscaid last spring; a few more seasons will be required to prove whether it is perfectly hardy or not.

Milwaukee. Fruited for the second time this year. The tree makes a very vigorous spreading growth, and is very healthy and hardy; foliage, large, dark green and abundant; fruit, $3\frac{1}{2}$x$2\frac{1}{2}$ inches, oblate; calyx partly closed, set in a rather deep, broad basin; stem, slender, in a deep, broad cavity; skin, yellow splashed with bright red; flesh, a little coarse, crisp breaking, juicy, acid. Kept well last year through February. This variety gives promise of being a valuable mid-winter apple and a good shipper. Desirable.

Shackelford. Fruited for the first time. Tree, a slender speading grower; foliage, small, light green; fruit, $2\frac{1}{4}$x$1\frac{3}{4}$, roundish; caylx, closed in a shallow, broad basin; stem, slender in a shallow cavity; skin, greenish yellow, splashed with pale red, smooth, almost greasy; flesh, greenish white, tender, crisp, juicy, mild, sub-acid, good.

So far as we know at present the most profitable apples to grow in this section for the different seasons are as follows:

Summer and Early Fall. Yellow Transparent, Red Astrachan, Duchess, Brockville Beauty, Alexander.

Fall and Early Winter. Fameuse, McIntosh Red, Scarlet Pippin, Wealthy.

Mid-Winter and Late Winter. Golden Russet, Scott's Winter, Talman Sweet.

Promising.—Ontario, Milwaukee.

Notes by G. C. Caston. (*Simcoe Fruit Station.*)

Russian Apples. Some new varieties have fruited this year.

Bode. A Russian apple from the Experimental Farm, Ottawa; is best dessert apple yet tested among the Russian varieties; tree, upright, vigorous, healthy; fruit above medium size, conical; skin, green streaked with red; flesh, white tinged with red, tender, juicy with an agreeable flavor. Season early September.

Karabouka. A Russian, is a *fac simile* of Yellow Transparent; same season; a little smaller in size.

Lubsk Queen. A handsome Russian apple of medium size; round and smooth, with yellow skin and a bright red cheek like Maiden's Blush, but covered with a delicate bloom; it is a good cooker but with no pronounced flavor; season August; tree, healthy and vigorous, an upright grower.

Romanskoe. A large Russian apple somewhat resembles the Colvert but larger; a good cooker but has no dessert quality; tree bears young and is a strong, healthy, vigorous grower. This is a handsome apple, and would no doubt be valuable for northern districts; season, September.

Bogdanoff. This is the longest keeper of the Russians fruited up to date ; it is at this writing November 9th, quite firm and solid ; tree healthy, strong, upright grower ; fruit, large, flattened and somewhat ribbed ; skin, greenish yellow overspread and splashed with dull red ; calyx closed in broad deep plaited basin ; stalk, short and slim, set in a shallow insected cavity ; flesh, yellow with no pronounced flavor.

I doubt if we will find among the Russian apples anything that will at all compare in quality with the best of our old and valuable commercial varieties However they have two qualities to their credit ; they are mostly hardy and may prove valuable for northern districts where other varieties could not be grown, and they make splendid stock for top grafting our best commercial apples on.

Other Varieties :

Boiken. Sent by Stone and Wellington in 1896. Tree resembles Golden Russet, best began to bear two years after planting ; this year was loaded with fruit. A handsome apple above medium size with yellow skin and a bright red cheek ; flesh, white, a splendid cooker, would probably keep well until February This apple from its bright, clean and handsome appearance, good cooking qualities and early abundant bearing, is likely to prove a good one and well worthy a place in the commercial list.

Gano. I am inclined to believe that in this apple we have one that is going to prove of great value ; the tree resembles Ben Davis so closely that it would be hard to distinguish them apart ; the same habit of growth ; the same abundance of small twig like branches, requiring a frequent use of the pruning shears ; an early bearer. These have borne two years after planting and every year since ; planted in 95, two of these trees yielded a barrel of apples this year. It will keep as long as Ben Davis, and I believe will to a great extent supplant that variety. It is a much better apple as to quality, handsome appearance, a deep dark red when matured ; above medium size, clean skinned and free from blemishes. It ought to be a valuable sort for the British market.

Winter St. Lawrence. This is no improvement on the Fall St. Lawrence, and I doubt if it would keep a month longer.

Downing's Winter Maiden's Blush. This resembles the fall variety of that name but keeps a longer and is larger in size.

Barry. A yellow apple above medium size. I see nothing about it to recommend it so far. With respect to new varieties of apples, we must be very careful about recommending them. Nothing should be added to our commercial list, unless it has very high merit to commend it The complaint is justly made that we are growing far too many varieties now. This fact is doing us injury in the British market.

Top Grafting. I feel that I cannot too strongly advise the top working of our best commercial apples on hardy free-growing healthy stock, as the best practice for this section of country, and taking the scions from the best bearing trees. Had this plan been adopted twenty years ago it would have added many thousands of dollars to the returns from our orchards. The question is often asked in this connection—What is the best stock to use for that purpose? There is nothing better than Talman Sweet. It is hardy, a free grower does not split easily when loaded with fruit, and unites well with any variety grafted on it. I have also experimented with several other kinds of stock, and have had good success, with grafting Spy, Ontario Baldwin, King and Greening on the following stocks, Haas, Longfield, Wallbridge, Bell, De Boskoop, Yellow Transparent, Blushed Colville, Anisim, Alexander. Such slow growing varieties as Duchess and Wealthy which overload with fruit, and though hardy and healthy make too slow growth of wood, are not good stocks for that purpose. The same may be said of many of the crabs, though I have found some of them do very well. My experience proves that in every case where our best apples are top worked on good healthy suitable stock, the fruit is of superior quality. We get earlier bearing, greater yields, more regular crops, and as Col. Sellers says in "The Gilded Age," "*There's millions in it.*"

BLACKBERRIES.

NOTES BY A. W. PEART. (*Burlington Station.*)

Blackberries were a good crop Owing to the cold wet weather in May, blooming as well as ripening was delayed from a week to ten days beyond the normal period. Prices were satisfactory, ranging from 7 to 12 cents a quart according to size and quality. The best commercial varieties so far tested are :—Agawam, Erie, Gainor, Kittatinny, Ohmer, Snyder, Stone's Hardy, Taylor, Western Triumph. Of the early varieties, Early King and Early Harvest, have done the best, although both are somewhat tender.

Agawam. Plant upright spreading hardy, vigorous and productive ; berry, oblong, round, medium size, sweet but rather insipid. Season, medium, to late, one of the best.

Ancient Briton. Plant, upright, spreading, hardy, medium, vigorous but not productive ; berry, oblong, conical, medium size, good flavor. Season, medium.

Child's Tree. Plant, upright, spreading, hardy, moderately vigorous, not very productive ; berry, ovate, round, small to medium, flesh, firm, sweet and sprightly in flavor. Season, medium

Dorchester. Plant, upright, spreading, very vigorous, hardy, but only a moderate bearer ; berry, large, oblong, round, firm, sweet and sprightly in flavor. Season, medium.

Early Cluster. Plant, upright, moderately vigorous, tender and unproductive ; berry, medium size, oblong, round, good in quality. Season, medium to late

Early Harvest Plant, upright, medium vigor, tender, but very productive ; berry, medium, to large, oblong, conical, fair in flavor. Season, early.

Early King. Plant, upright, spreading, medium vigor, tender but productive ; berry small to medium, oblong, round, of good quality Season, early to medium.

Eldorado Plant, upright, spreading, vigorous, hardy, and moderately productive ; berry, oblong, conical, medium, to large, sprightly, good in flavor. Season, medium.

Erie Plant, upright, spreading, vigorous, hardy and productive ; berry, medium size, conical, round, excellent in quality. Season, medium. A good commercial variety.

Gainor Plant, upright, vigorous, hardy and productive ; berry, very large, roundish, oblong, fine in quality Season, medium. A promising commercial variety.

Kittatinny. Plant, upright, very strong and vigorous. Productive and hardy here thus far ; berry, moderately firm, large to very large, ovate, conical, rich, juicy and sweet. Season, late. A fine commercial blackberry.

Lovett's Best Plant, upright, stiff, moderately vigorous, hardy but not productive ; berry, oblong, round, small, of fair quality. Season, late.

Maxwell Plant, very weak and spreading, tender and not productive ; berry, oblong, round, large to very large, quality, excellent Season, medium. Too weak for commercial purposes

Minnewaski. Plant, upright, spreading, vigorous, but tender and unproductive ; berry, medium to large, oblong, round, of good quality. Season, medium.

Ohmer. Plant, upright, spreading, moderately vigorous, hardy and fairly productive ; berry, very large, oblong, conical, good quality Season, medium.

Snyder. Plant, upright, medium vigor, hardy and very productive ; berry, medium, oblong, oval, fair quality Season, early to medium. One of the best market varieties. with a rich soil, and damp subsoil. This berry like the Western Triumph, will give very heavy crops of fruit.

Stone's Hardy Plant, upright, spreading, moderately vigorous, hardy and productive ; berry, medium, oblong, conical of fine quality. Season, medium. This variety is very promising.

Taylor. Plant, upright, vigorous, hardy and moderately productive ; berry, medium, oblong, conical. Season, medium. A valuable commercial berry.

Wachusetts. Plant, upright, vigorous, hardy but not productive ; very, few thorns ; berry, medium, oblong, round, sweet, of excellent quality. Season, medium, to late.

Western Triumph. Plant, upright, very strong and vigorous, hardy and very productive ; very thorny ; berry, medium, oblong, round, of good quality. Season, medium. A good market variety, but requires a rich damp soil.

Wilson's Early. Plant, rather weak, hardy but not very productive ; berry, large, oblong, round, good quality. Season, medium.

Wilson Junior. Plant, spreading, vinous, trailing on the ground. Propagates by both tips and suckers. Hardy but not productive. Fruit, medium, oblong, conical, sweet. Season, medium.

CHERRIES.

NOTES BY L WOOLVERTON. (*Maplehurst Fruit Station.*)

The past season has been a most peculiar one, with most disastrous results. Nearly the whole of May was characterized by an almost constant rainfall ; as a consequence the pollen of the cherry bloom was not only weakened, but largely washed out, and, while the bloom appeared abundant enough, and much of it seemed to be setting, it was gradually evident that the young fruit was not well fertilized and that very little of it would grow and mature. During the month of June this daily grew more evident, and another evil also resulted from the excess of wet, viz, a very wide-spread attack of monilia, even upon varieties not usually much subject to it. When the time came for cherries, no cherries were left, for, between the dropping from weakness of stem, the monilia and the blasting, the whole of the Early Purple and Governor Wood cherries failed to ripen.

Such varieties as held on ripened most irregularly. Early Richmond ripened about July 1st in some orchards, and much later in others. Of Black cherries, about half ripened July 8th, and the balance were still very green, except a large share which blasted or rotted.

Altogether, the crop was such a failure that we are unable to give such an extended report as we hoped to do. We have added a large number of new varieties from the Baltet Nurseries, Troyes, France, and we hope by these not only to verify the older varieties in cultivation here, but also to find some new and more valuable varieties. The trees came in splendid condition and every one grew well.

We succeeded in putting up a few cherries in bottles for the Pan American, but it was a great disappointment that we could not put up sixty or seventy varieties as we had anticipated. We hope next year to make a sufficiently important report to make up for the shortness of this one.

Spraying has this season been proven effective in a commercial way with cherries. In the vicinity of Grimsby, the monilia has been very serious, resulting in the total destruction of the cherry crop. At first a large crop seemed to set and begin to grow, but most of them blasted. Still we expected a good crop of certain varieties, as, for example, Black Tartarian, which showed up fairly well as they turned black on the trees, but a day or two later, when we began gathering, the rot had begun its work, and in forty-eight hours nothing was left worth gathering. Even Montmorency and English Morello went the same, scarcely giving a perfect sample.

In the midst of this universal failure, we have to record the most signal success in spraying for cherry rot. Mr. McKinnon, near Maplehurst, sprayed twice with Bordeaux as the young cherries were growing, and, as a result, gathered about 300 baskets of Kentish and Morello cherries. Spraying a young cherry orchard, probably two or three days work in all, paid a profit of about $300. Mr. Brennan, next to Mr. McKinnon, had similar results, and these two stand almost alone in having cherries to ship this season. Indeed, very few persons had even enough for home uses.

At Winona, Mr. W. M. Orr, formerly Government superintendent of spraying, reports the same remarkable results from spraying. He gave several applications of Bordeaux to his Flemish Beauty pears, keeping the trees green with it throughout the growing season, and, as a result, he had a magnificent crop of perfect pears on a variety that is always most subject to scab, and usually worthless in consequence. He treated his cherry trees in the same way, and, as a result, had a magnificent crop of Black Tartarian and other varieties. He sent samples to the Ontario fruit exhibit at Buffalo, and Mr. Bunting reports that they were the finest shown.

The following are a few notes of the varieties of cherries which matured their fruit:—

Early Richmond showed the first ripe cherries about the 1st of July, but ripened very irregularly, owing to curculio. A few samples of this variety were sent to the Pan-American fruit exhibit.

Governor Wood and *Cleveland* are the first really desirable varieties, but this season there was not even a single specimen of Cleveland, and the samples of Governor Wood which did set were either so rotten or wormy that they were worthless. It ripened about July 1st.

Knight's Early Black showed fairly at first, while still green, but by July 8th, when about ready to harvest, they were nearly all destroyed by curculio, or blasting or dropping.

American Amber, which is usually not wanted in competition with Governor Wood or Elton, was this year almost the only cherry of its season. About half the crop was blasted or rotten, while the balance was much under size.

Black Tartarian looked well up to about July 1st, when monilia attacked them, and by the 8th over half were ripening and many of them rotting badly. The fruit was very irregular in size. We began harvesting on the 8th in order to save as many as possible.

Olivet was turning red on July 8th, with about one quarter of a crop. The tree is vigorous, outgrowing Montmorency.

NOTES BY G. C. CASTON. (*Simcoe Fruit Station.*)

Many of the Cherries under test are Russians, but unlike the Russian apples are a valuable acquisition. Several varieties have borne fruit and with the exception of Vladimir, all have proved to be of good quality and valuable for culinary use. There has been lots of trouble with wrong naming of varieties by the nurserymen sending them out. One labelled "Ostheim" turned out to be Early Richmond, and many other similar mistakes were made, requiring a lot of trouble to get right. Everything that came from the Central Experimental Farm at Ottawa, was evidently labelled correctly.

Litham Tree free healthy grower, with very fine willow-like brush, requires frequent pruning. Fruit, small, nearly black when ripe, a little astringent but cans fairly well.

Greiner Glass. Tree healthy, vigorous, and early bearer prolific. Fruit large, $\frac{3}{4}$ in. in diameter, sub-acid, dark red when ripe, resembles Morello, a good canner.

Red May. Tree vigorous, upright, rich dark foliage. Fruit large, over $\frac{3}{4}$ in., stem 2 in. Dark red, very handsome, quality very good, very promising.

Schattan Amarelle. This is, as I have it here, evidently the English Morello under another name, but another tree in same row that came with it may be the true Amarelle. This tree is healthy, bears young. Fruit large, over $\frac{3}{4}$ in., very juicy, meaty, very free stone, stem slender over 2 in., skin bright red, a very handsome cherry, excellent for culinary use.

Spate Amarelle. This is a *fac simile* of the preceding one, evidently the same under another name.

Love Apple. This Cherry with rather a queer name is a very superior variety. Tree an upright grower, healthy, vigorous, rather a shy bearer while young Foliage rich with large leaves. Fruit bright red, large, meaty, with a sweet rich flavor. Stem medium. An excellent dessert variety.

Grenner Glass. Tree vigorous, healthy. Fruit large, bright red, a little flattened at the ends, quality first-class for canning Stem short, stout. A very promising variety.

Russian 207. Tree vigorous. healthy, but with smaller leaves than the other varieties, spreading habit of growth. Fruit large, handsome, bright red, rather acid, but cans fairly well. Stem very long and slender.

Wragg. This is English Morello under another name Several young trees have not yet come into bearing. I may find the true Wragg among these.

Strauss Weichsel. Tree, a medium grower, healthy; fruit above medium size, black when ripe, and of splendid quality The robins seemed to appreciate the superior quality of this cherry, for they quickly appropriated the few specimens that were on the tree.

Lutovka. A promising Russian variety tree; a thrifty, healthy grower, but does not bear as early as some of the others; fruit, large, flattened, bright red; stem, medium, stout: quality, very good.

Sklanka. Resembles Early Richmond, but is a week later.

Orel. Tree, spreading habit of growth; healthy, with small leaves; fruit, large, bright red, very handsome; stem, 1½ in.; quality, very good. Ripe, July 16.

Orel 24. A black variety, resembling Ostheim; of medium size, and excellent for canning.

Ostheim. This is my favorite of all the Russian varieties. The tree is not so vigorous or the foliage as rich as in many of the others. But the fruit for canning purposes, in my opinion, easily excels them all. The tree bears young, and is quite prolific. The fruit is of medium size, and nearly black when ripe.

Brusseler Braun and *Griotte du Nord* resemble each other very closely. They are both shy bearers. Trees are vigorous and healthy; fruit, dark red, large, with long, coarse stems; quality, fairly good; ripens very late, first week of August.

The first to ripen was Early Richmond, a week later Sklanka, then Lutovka and Russian 207. Then the other varieties may be said to have come in together. So that the season extended from the first to about the 20th of July, with the exception of the two varieties above noted, which did not ripen until August.

Yields—The most prolific are Dyehouse and the English Morello. Dyehouse, planted in 1894, yielded 6 baskets, or 60 Imperial q'ts. to the tree English Morello, planted in 1896, yielded 30 qts. These yields were from some of the best trees. Ostheim, planted in 1896, gave 25 Imperial qts. Orel 24, about the same, though an older tree. Litham, the small black cherry already described, came close to the Morello in yield. It was planted at the same time. All the varieties mentioned and described in this report gave excellent satisfaction to those who bought them. They were all pronounced to be first-rate for canning. So that, with their healthy growth, hardiness, early bearing and quality of the fruit, we have a valuable acquisition for this section in those hardy cherries.

NOTES BY A. E. SHERRINGTON. (*Lake Huron Fruit Station*)

CHERRIES. There are now about twenty-two varieties planted at this station. Nearly all varieties are thriving and doing well; they are cultivated the same as the plum orchard. Very little pruning is necessary to be done in the cherry orchard—a little thinning out and heading in where certain limbs are making too rapid growth. Notes follow on a few of the varieties that fruited this season.

English Morello Tree, a rather slow grower, but hardy; will make a good orchard tree; fruit large, 3¼ x 3¼; stem, 1½ in. long; color, dark red, pit small, flavor tart, with colored juice; date of blooming, May 18th; ripe, July 22nd; yield, 13 pounds; four years old.

Empress Eugene. Tree, quite vigorous, apparently hardy, large seven-eighths by three-quarters inches, stem two inches long, color bright carmine, flesh firm, flavour sweet, bloomed May, 11th, ripe July, 16th, yield two pounds; three years old.

Late Duke Tree, a small upright grower, hardy, fruit large, one by seven eighths inches, stem two inches long, color dark red, pit large, flesh firm, flavor sub-acid, quality good, ripe July 16th, yield 12 pounds; four years old.

Montmorency. Tree vigorous and hardy, spreading fruit medium size, five-eighths by three-quarters inches, stem one and a half inches, color red, pit small, flavor acid, fine for canning, a profitable variety, bloomed May 11th, ripe July 17th, yield 12 pounds per tree; six years old.

Ostheim This is a very ornamental tree, it would not be out of place in the lawn, limbs slender and drooping, foliage, dark green, hardy, fruit medium size, three-quarters by five-eighths, stem one and a half, color dark red, almost black, quality very good, nearly sweet, pit small, bloom May 11th ripe July 18th, yield 12 pounds; four years old.

Olivet. Tree resembles *Montmorency*, a little more upright in growth, vigorous and hardy, fruit large, color red, flavor acid, firm, quality good, bloom May 9th, ripe July 16th, yield four pounds; five years old.

Wragg. Tree good, strong grower, upright to spreading hardy, fruit large, three-quarters by three quarters inches, stem one and a quarter to one and a half long, color dark red, flavor tart, colored juice, pit medium, quality only fair, bloomed May 17th, ripe July 22nd. yield 22 pounds; four years old.

Windsor. Tree resembles *Heart* varieties, but more spreading, a vigorous grower, but not quite as hardy as it might be in this section, fruit large, liver colored, quality good, flavor sub-acid, bloomed May 7th, ripe July 1st, yield none, as the birds took the whole crop; five years old.

Yellow Spanish. Tree a rather poor grower, spreading half hardy, fruit large, fine and sweet, color yellow, bloomed May 5th, ripe July 1st; the birds got those also; five years old.

Reine Hortense. Tree, upright spreading, vigorous, and appears to be hardy, fruit very large, bright red, quality good, bloomed May 9th, ripe July 10th.

CURRANTS.

NOTES BY A. W. PEART. (*Burlington Fruit Station.*)

Currants were a fine crop. Prices were higher than for many years, ranging from five to six cents per quart for red and eight to nine cents for black.

In red varieties, Wilder again takes the lead with an average of seven and a half quarts per bushel. Red Cross and Pomona also did well, the latter especially being very promising both in yield and quality. The berry of the Red Cross is rather small. The Cherry still holds its own as a desirable market variety. Fay's Prolific, although a fine currant, does not crop so heavily as the Cherry.

In the black varieties, Collins' Prolific, Saunders and Naples take the lead in the order given. Collins is a very rank, vigorous growing variety, but begins bearing somewhat late. Saunders promises well, while the Naples still maintains its reputation for commercial purposes.

In white currants, the White Grape is more productive than the White Imperial, but lacks the fine quality of the latter.

Belle de St. Giles. Bush, medium vigor, healthy and hardy, but not very productive; bunch, long and compact; berry, red, large, sub-acid, of excellent quality. Season, medium. Scarcely productive enough for commercial purposes.

Black Victoria. Bush, of medium vigor, healthy, hardy and productive; berry, large, firm, sweet, of fine quality. An early black variety.

Brayley's Seedling. Bush, vigorous, healthy, hardy and productive; bunch, long, straggling and loose; berry, red, medium sized, very acid. Season, medium.

Champion. Bush, vigorous, healthy, hardy and moderately productive; berry, very large, black, somewhat acid. A late black variety.

Cherry. Bush, strong, upright, vigorous, healthy, hardy and very productive; bunch, somewhat short, compact; berry, dark red, firm, large, acid, of fair quality. Season, medium. Probably the most generally profitable of the older red currants.

Collin's Prolific. Bush, a very rank, strong grower, healthy, hardy and productive; berry, large to very large, black, firm, acid. Season, medium to late. This variety is very promising.

Crandall. Bush, hardy, healthy, vigorous, rampant and productive; berry, variable in size, from medium to very large, bluish-black, of a sprightly sub-acid flavor. Season, July 15 to Sept. 1st. It ripens by degrees, and seems inclined to bear heavily every other year. Its commercial value cannot be estimated as yet.

Fay's Prolific. Bush, a fair grower, hard, healthy and moderately productive; bunch, very long, somewhat loose; berry, large to very large, red, firm, sub-acid. Season, medium. Requires a rich soil.

Lee's Prolific. Bush, moderately vigorous, healthy, hardy and moderately productive; berry, black, very large, sub acid. Season, medium. A good commercial currant but requires a rich, well-kept soil.

Naples. Bush, strong, vigorous, hardy, healthy and very productive; berry, large, black sub-acid. Season, medium. One of the best blacks.

New Victoria. Bush, vigorous, hardy, but not very productive; bunch, long, loose; berry, red, small to medium, acid but rather pleasant in flavor. Season, medium.

North Star. Bush, medium vigor, hardy, healthy and moderately productive; bunch, medium length, compact; berry, red, medium to large, acid but sprightly and good in flavor. Season, medium to late. Has a place as a late red currant

Pomona. Bush, vigorous, healthy, hardy and productive; bunch, long, compact; berry, red, large, sub-acid, of excellent quality. Season, medium. A promising new variety.

Prince Albert. Bush, vigorous, healthy and hardy, leaves large and deeply cut; bunch, short to medium; berry, small to medium, red, very acid. Season, late.

Raby Castle. Bush, vigorous, hardy, healthy and very productive; bunch, short and compact; berry, red, small to medium, firm, acid. Season, medium. Very productive, but too small.

Red Cross. Bush, medium vigor, hardy and productive; bunch, short and compact; berry, small to medium, red, firm, sprightly, sub-acid. Season, medium.

Red Dutch. Bush, strong, healthy, hardy and productive; bunch, medium length, loose; berry, red, small, sub-acid of fine flavor. Season, early to medium.

Red Victoria. Bush, strong, hardy, healthy, vigorous and very productive; bunch, long and loose; berry, large, bright red, tenacious, firm, acid but of good quality. Season, medium. A good commercial variety.

Saunders. Bush, strong, vigorous, hardy, healthy and very productive; berry, black, large, of a good sub-acid flavor. Season, medium to late. A promising commercial currant.

Versailles. Bush, moderately vigorous, healthy, hardy and fairly productive; bunch, medium length and fairly compact; berry, red, medium size, not so acid as the cherry. Season, early to medium.

White Grape. Bush, medium vigor, hardy and productive; bunch, long and straggling; berry, white, large, sub acid pleasant in flavor. Season, medium to late.

White Imperial. Bush, vigorous, hardy, healthy and moderately productive; bunch, long and loose; berry, white, large, of excellent quality. Season, medium. A fine dessert currant.

Wilder. Bush, vigorous, hardy, healthy and very productive; bunch, medium length, compact; berry, red, large, sub-acid of excellent quality. Season, medium. A most promising red currant.

Notes by A. E. Sherrington. (*Lake Huron Fruit Station.*)

Currants. The currant crop was very good this summer, the demand for the fruit was extra good, at fair prices; there are now fifteen varieties planted, all seem to thrive and do well, very little difference in habits and nature of growth. They are all vigorous growers with exception of Cherry, which is a rather slow grower, but a good yielder of very large fruit.

Black Victoria. Plant, strong, vigorous and hardy, fruit large, quality good, ripe July 26th, yield four oz, two years old.

Cherry. Plant, rather slow grower, not so vigorous as Fay's, but hardy, fruit very large, quality of the best, color red, ripe July 16th, yield one lb., five oz., five years old.

Champion. A strong, vigorous grower, fruit large, color black, quality good, ripe July 16th, yield two lbs. per bush, five years old.

Naples. A strong, vigorous grower, healthy and hardy, very productive, fruit large, color black, quality good, ripe July 26th, yield five qts. per bush, three years old.

North Star. A fair grower of spreading habit, rather weak canes, fruit small, color red, quality poor, ripe July 28th, yield one lb., two years old.

Pomona. Plant, a good, strong, compact grower, fruit medium to large, color red, quality first class, this is the sweetest currant in the plot, ripe July 10th, yield four lbs. per bush, three years old.

Prince Albert. A strong upright grower, forming a compact bush, foliage very handsome, bush quite ornamental, fruit bunches long, medium size, color red, quality fair, ripe July 26th, yield one lb., 5 oz., two years old.

Raby Castle. A vigorous and rapid grower, very hardy, fruit small, color red, quality only fair, flavor tart, ripe Aug. 20th, yield five lbs., six years old.

Saunders. Plant, vigorous, strong and hardy, fruit medium, color black, quality very good, ripe Aug. 28th, yield four oz., two years old.

Versailles A vigorous, strong grower, fruit large, color red, quality good, ripe July 20th, yield one lb , two years old.

Red Cross, *White Grape*, and *Crandle* were planted this spring. All made an excellent growth.

GOOSEBERRIES.

NOTES BY STANLEY SPILLETT.

Autocrat gave as usual a large crop of large green berries of medium quality. Skin of fruit very thick and tough. It mildewed more than pure English varieties but less than most of the English seedlings. Bush, a good grower ; yielded 4 quarts to the bush ; sold at 6 cents per quart.

Whitesmith gave a large crop of medium sized yellow berries of good quality. Skin, thin for an English variety. Bush, almost as good a grower as Downing. For general planting this is the best all-round English gooseberry I have ; yield, 4 quarts, at 6 cents.

Queen Chautauqua, *Golden Prolific*, *Large Golden Prolific*, *Yellow Scotch*, *Columbian Dominion*, and *Mrs. Whittaker* all gave large crop of large yellow berries of good quality so much alike that it would be hard to distinguish them. All mildewed badly. 3 qts. at 6 cents.

Ontario. A very promising large berry of poor flavor. Bush, a good grower.

Crosby's Seedling. One of the largest berries ; red ; good flavor. Skin, thick and tough Mildewed badly. Bush, a good grower but sprawling.

Keen's Seedling. Bush simply will not grow wood. A few beautiful berries of fine flavor.

Keepsake. Berry, large and roundish ; good flavor. Skin, thick and tough ; less affected by mildew than any other except Ontario. Bush, medium grower. 2 quarts, at 6 cents.

Crown Bob. 2 quarts of fine berries.

Triumph might be classed with Chautauqua. Large yellow berry of good flavor.

Lancashire Lad. A large, red berry of fine flavor. Skin, thick. Bush, poor grower. 1 quart, at 6 cents.

Green Chisel. Pure English berry ; large ; green ; poor flavor. Skin, thick and tough. Bush, best grower of all the varieties imported. 1 quart, at 6 cents.

Cook's Eagle, *Ingram's Ocean*, and *Ironmonger* gave a small crop of very large berries, greenish white. Skin, thick and tough. Bushes, poor growers.

Loudon and *No Name* gave nice crop of berries of the size of small Downings, of poor flavor. Skin, thick, hairy. Bushes, poor growers.

Marion gave 1 quart of very large berries ; yellowish white ; poor flavor. Skin, thick. Bush, poor grower. 1 quart, at 6 cents.

AMERICAN VARIETIES. *Champion* gave a large crop of greenish white berries as large as Downing. Medium quality. Thin, tender skin. Bush, a great grower. Free from mildew. This berry gets its growth fully two weeks earlier than any other variety except Smith's Improved. Best for pickling green. 8 quarts, at 5 cents per quart.

Downing and *Pearl* are too well known to need any description. Best sweet berries. 6 quarts, at 5 cents.

Oregon Jumbo is a Red Jacket, and *Success* a Downning.

Red Jacket gave a large crop of beautiful, pinkish, transparent berries. Acid fruity taste. Skin, thin and tender. Berry, 1 inch long, while best Pearl was $\frac{7}{8}$ inch. Twelve berries weighed $2\frac{1}{4}$ ounces ; Pearl, $1\frac{3}{4}$ ounces. Free from mildew. Bush, the best of all growers after the second year. Best for either home use or market, unless one can grow Whitesmith. $7\frac{1}{2}$ quarts to the bush, at 6 cents.

GRAPES.

NOTES BY L. WOOLVERTON. (*Maplehurst Fruit Station.*)

Jessica. When well grown and well ripened the Jessica is a variety of which we are not ashamed to say that it is of Canadian origin. Our photograph on page 10, well represents its appearance, and is almost a fac-simile of a colored plate prepared for Mr. Beadle by Rolph Smith & Co., of Toronto, in 1884. It is too small a berry for the commercial vineyard.

Its previous reputation as a dessert grape has been borne out this season by its conduct in our experimental plot. Near it we had the Green Mountain, and on selecting samples of both for photographing we were much struck with their close resemblance in bunch and berry. The flavor of our Canadian was superior to Green Mountain, but otherwise one could declare them identical. We, in Canada, have been much disappointed in the latter, which was introduced with so much *eclat* by Stephen Hoyt & Sons, of Connecticut. It is too small for market and inferior as a dessert grape to Jessica, and yet the Bushberg catalogue gives nearly a column to it, and less than an inch to the latter; while the Jessica is not even mentioned in the catalogue issued by the American Pomological Society.

We have had a remarkably fine showing of grapes of all kinds at Maplehurst this season.

Moyer was the first to ripen, and was quite delicious eating long before Early Victor, Berckman, Ohio or Campbell's Early were ready for use. That variety is another that is valuable for a home garden, but probably not profitable for market because of its small berry and straggling bunch, but it is a treat to get so pleasing a flavored grape so early in August. The Moyer, too, is of Canadian origin.

NOTES BY M. PETTIT. (*Wentworth Station.*)

One hundred and forty-three varieties of grapes fruited the past season. The crop as a whole ripened better than usual, but many of the newer kinds are very disappointing when compared with the old and reliable market varieties

Alice, a new and highly lauded variety, bore a very good crop considering the size of the vines. It so closely resembles the old Diana, that an expert cannot tell the difference. If not Diana, it does not appear to be an improvement on it.

Amber Queen, which promised to be of some value, is subject to mildew. It does not yield enough to be profitable, and when left on the vine for some time after ripening turns a dull dark color and loses both its sprightly appearance and flavor.

Brilliant, a medium sized red grape of excellent flavor. The vine is very healthy, and vigorous. It produced 22½ lbs. to the vine; the clusters are rather small and loose. I do not think it could be profitably grown in comparison with the larger and more productive Red Roger varieties.

Campbell's Early, from every indication this grape can be strongly recommended for general cultivation in this part of Ontario. The special merits of this grape are that it ripens nearly as early as the Champion; the vine is vigorous and productive; the fruit is large and attractive; the skin is tough; pulp, rather firm and sweet; the seeds separate readily, and it clings well to the cluster without dropping. Unless it develops some weakness not yet seen, it should be grown extensively and take the place of Champion and other inferior early grapes.

Dr. Collier, one of the most profitable of the newer black grapes. It very closely resembles Concord in appearance, flavor, and time of ripening; the vine is healthy and free from mildew. I do not think it would produce as much fruit as Concord.

Early Victor, a very productive black grape; bunches compact, medium sized; quality good, vine, vigorous hardy and healthy; yield 26½ lbs. to the vine; it ripens a little earlier than Concord.

Woodruff's Red, a fine large showy grape, fairly productive; not quite good enough in quality.

Mills, at first considered productive but lacks vigor; it does not produce enough bearing wood for a crop; the quality of the grape is good and one of the very longest keepers.

Winchell, a white grape, at first considered profitable, also lacks vigor of vine. A great many of the white grapes planted at this station are of little value when compared with Niagara as a profitable market grape.

Moore's Diamond, comes next in profit; it ripens earlier than Niagara, and on that account brings a higher price; but it does not produce more than half the quantity.

In red grapes, *Agawam*, (Rogers No. 15) heads the list for profit; a regular, heavy bearer; good shipper; and it always commands a fair price. *Catawba*, *Requa*, (Rogers No. 28) and *Lindley*, (Rogers No. 9) are also some of the most profitable.

In Black Grapes. *Worden*, *Concord*, *Wilder* (Rogers No. 4), *Barry* (Rogers No. 43), and *Herbert* (Rogers No. 44), are the most profitable.

PEACHES.

NOTES BY L. WOOLVERTON. (*Maplehurst Station.*)

The season opened at Maplehurst on the 27th of July, with the Sneed, the earliest good peach, and one that well deserves to be planted freely. It is agreeable in flavor, very juicy, but a poor market peach, because it ripens too rapidly; but it is much more desirable for dessert than such varieties as Alexander, Hale's Early, Early Purple, Rivers, etc. For shipping it must be picked while still quite firm. On the 1st of August we found many prematures already overripe and fallen.

The *Alexander* succeeded this variety about the 5th of August, and kept up the shipments until about the 13th. Owing to the scarcity of the fruit, the prices of these early varieties were better than usual.

The *Triumph* peach was harvested between the 15th and 21st of August, and was the best market peach of its season at Maplehurst. It is a yellow fleshed peach, and not a close cling-stone as most early peaches are, so that it suits a demand in Canada for yellow-fleshed peaches. The tree is vigorous and productive, but is inclined to blight as the fruit ripens, if conditions favor, a disease which sometimes attacks both twigs and fruit. The fruit is dull in color and very thickly coated with down which stands in the way of its popularity.

Early Rivers is a white fleshed peach about the same in season as Triumph (August 15th to August 25th in 1901) and was at one time largely planted in Ontario. We harvested about two or three hundred baskets in 1901 at Maplehurst, but found them the most unsatisfactory of any peaches for shipping, because they are so tender in flesh and ripen so rapidly. Besides, every mark causes discoloration.

Greensboro', a new white fleshed peach from North Carolina, with red cheek, above medium size and rather attractive, is also of about the same season as the Triumph. It is also too tender in flesh to be a profitable market peach; still it is much superior to the Early Rivers.

Hynes is another white fleshed early peach of the Alexander type, more agreeable for dessert, but averaging smaller in size. It ripens about the 20th of August, and, we judge, is not likely to be much planted for market, as it is much inclined to rot on the trees and seems to be quite subject to yellows.

The *Yellow St. John* was the first really good yellow peach, and it colored up beautifully about the last week in August, when fine samples would almost pass for Early Crawford. It is a valuable market peach. but, when it is left to hang into September, there is a great waste from rot.

The *Champion* came in about the 1st of September, closely following the Yellow St. John, and the last specimens were gathered about the 7th with the first Crawfords. It is a beautiful white peach with red cheek, and of large size, frequently measuring 2½ inches in diameter. The stone is free, the flesh is white, tender, juicy and the flavor is delicious. We consider it the best dessert peach of its season.

The *Early Crawford* began ripening on the 6th of September, and, when it is going forward, really no other variety can compare with it either for size, beauty or general excellence. The crop was fairly good, and the price from 75c to $1.00 a basket. Where the trees were highly fertilized, the increase in productiveness was very evident.

Fitzgerald came in about the same season as Crawford, and seemed to be similar in many respects.

PEARS.

NOTES ON SUMMER PEARS BY L. WOOLVERTON. (*Maplehurst Fruit Farm.*)

Our experimental plot of dwarf pears consists of over fifty varieties, and we had hoped for a splendid assortment of samples for our report, but, unfortunately, the same condition which blighted our hopes as commercial fruit growers, also swept away our hopes of a grand collection of varieties for study and for exhibition purposes.

The first pear to ripen with us in the season of 1901 was *Summer Doyenne*, about July 30. The fruit was in clusters, very small, too small for market, but of delicious quality for dessert. The trees are not as thrifty as Brandywine or Wilder. The last picking was Aug. 12th.

The *Chambers* closely followed the Summer Doyenne, ripening about the 5th of August. The trees were heavily loaded, and the fine size of this pear makes it the most promising variety of its season for market. The tree is vigorous and healthy and, so far, has not shown any tendency to blight. The last picking was August 20th.

The *Giffard* closely followed Chambers in season of ripening, coming in this year, which is unusually late, about August 10th. It yielded a good crop, and the quality is so good and its appearance so pleasing, that it is the most largely planted for market in the Niagara district of any early variety.

Osband's Summer ripened about August 10th, and was over-much planted; this year the trees were heavily loaded, but very small, especially on the older trees. We do not recommend this variety now that finer ones of the same season have come in.

Lawson and *Andres des Portes* ripened about August 12th, on dwarf trees, but both are rendered worthless by a fault in common, namely, the rotting at the core almost before maturity. Lawson is a beautiful pear and the tree is very vigorous, but this season is unproductive and fruit stung with the curculio.

Wilder ripened about the same time, reaching full maturity and beauty about August 15th. The quality is fine when not allowed to hang too long and become mealy. The pears grow to above medium size and take on such gorgeous coloring that passers by are compelled to stop and look in wonder. Surely this would be a grand seller.

Manning's Elizabeth began to ripen on the 17th of August and continued in use, many still hanging, until the end of August. They were borne in great clusters and the tree showed great productiveness, but the fruit was too small to be valuable for market. The quality was very good.

Rostiezer came in about the same time, and was unusually large, averaging 2¼ inches in transverse diameter. The quality is the very best for dessert purposes, but, owing to its dull green color, it would not sell for any more than other small pears, and brought only about 30 cents per twelve quart basket in the Ottawa market. If this pear could have the superb coloring of the Wilder, it would be a wonderful treasure.

The *Tyson* began ripening about the last week in August, and, if left hanging, would come in about with the Bartlett, but it is so much smaller and inferior to that variety that we gathered the Tyson while still green and shipped them forward so that they might not come into competition. The trees are wonderfully healthy and vigorous. Some of them are now fifty years old and have never shown the least indication of blight.

The *Brandywine* began ripening about August 23rd. The samples were above medium size for pears, and fairly attractive, with dull red cheek on a yellow ground.

Clapp's Favorite was harvested about August 20th. It had attained full size and color, but was not ripe. The samples were magnificent. No pear of its season equals it for market. The year previous we exported a large share of our Clapps at the best prices.

Doyenne Boussock bore a magnificent crop; one tree twenty-five years planted yielded twelve baskets of fine pears. This pear ripens throughout September, about the same season as Bartlett, but we usually harvest it in advance of that variety.

The *Bartlett* came in about the 1st of September, and continued ripening until its season was over, about the 15th of September. It was subject to knots and scabs on clay soil, poorly cultivated, but, where cultivated and manured, it gave a magnificent crop of very fine fruit. We put up several hundred cases for the Glasgow market, and will report the result later on in the season.

Among the newer pears, we were much pleased with *Ansault* as a dessert pear. Too soft for distant shipment, it would find a place only in the gentleman's garden. It is not very attractive in appearance, being a dull green, nearly covered with russet, but when cut it reveals the finest and most delicate texture of flesh which can be described only by the old term "buttery," while its rich, sweetly perfumed flavor is most agreeable.

NOTES BY A. W. PEART. (*Burlington Fruit Station.*)

Bartlett Seckel Planted 1898. Tree an upright moderate grower. No fruit yet.

Beurre Giffard. Planted 1896. Very fair but somewhat slender grower. Spreading habit. Fruit medium, pyriform, greenish-yellow with red flush on sunny side. Flesh juicy, melting, of good quality. Season, early August.

Bufum. Planted 1897. A strong, upright grower. Pear small to medium, oblong-obovate, yellowish-red, slightly russet, sweet, pleasant flavor. Season, September.

Dempsey. Planted 1898. Moderate grower. No fruit yet.

Easter Beurre. Planted 1897. Tree upright-spreading, moderately vigorous. No fruit yet.

Idaho Planted 1896. A moderate grower, subject to blight. No fruit yet.

Josephine de Malines. Planted 1896. Moderately vigorous, upright-spreading. Fruit small to medium, roundish, slightly conical, yellow, juicy and sweet. Season, winter.

Lawrence. Planted 1896. Tree a strong upright-spreading grower. Fruit small to medium, obtuse-pyriform, yellow with some russet, juicy, melting and sweet. Season, early winter.

Lawson. Planted 1896 A moderate grower. No fruit yet.

Lincoln. Planted 1898. A strong grower. No fruit yet.

Osband's Summer. Planted 1897. Tree moderately vigorous, upright. Fruit medium, obtuse pyriform. Season, August.

Petite Marguerite Planted 1896. Tree vigorous, upright spreading. Fruit small to medium. obovate, melting, juicy and agreeable. Season, late August.

President Drouard. Planted 1897. Tree a moderate grower, upright. Fruit obtuse-pyriform. Season, late fall.

Sudduth. Planted 1897. Tree spreading, moderate grower. Fruit, medium. Season, fall.

Summer Doyenne. Planted 1896. Tree a moderate, upright grower. Fruit small, conical melting and juicy. Season, early August.

Tyson. Planted 1897. Tree a moderate, upright grower. No fruit yet.

Vermont Beauty Tree a moderate, upright grower. No fruit yet, although planted in 1896.

Wilder. Planted 1896. Tree a strong upright grower. Fruit obovate conical, medium, rich and sweet. Season, middle of August.

Winter Nelis. Planted 1896. Tree a moderate spreading grower. Fruit roundish-obovate, small to medium, russet skin, fine grained juicy and sweet. Early winter.

French Pears. Planted in June, 1890. All the varieties have lived and grown well, ranging from a foot to two feet of new wood this season. Bonne de Malines, Bergamotte Esperen, Dr. Jougré, Triumphe de Jedoigne, Citron de Carmes and Souvenir de la Salle have made the strongest growth.

NOTES BY HAROLD JONES. (*St. Lawrence Station.*)

The pear orchard was given clean cultivation from early spring to July 18th, when it was sown with red clover, which has made a good stand, and now gives a heavy deep covering over the entire ground. The trees have made a strong vigorous growth and the wood is well ripened up for the coming winter.

There was no injury to the trees last winter and spring, but the fruit buds on Dempsey, Goodale and Japan Golden Russet were injured.

Flemish Beauty. Planted 1894. Blossomed and the fruit matured perfectly. Free from spot or blemish. Given three sprayings. A hardy and desirable variety for this section. Spots and cracks badly when not sprayed.

Keiffer's Hybrid. Planted 1896. Has fruited for the third time a crop of well matured fruit. This tree is a strong, healthy grower and an early and heavy cropper. Fruit free from spot or other injuries, and when picked about the 10th October and allowed to ripen in a warm dark place is very attractive. This pear, though not of high quality, will be very desirable in this section, where we have so few to choose from

Beurre Clairgeau. Planted 1896 Has suffered from blight and sun scald and has been a failure generally, making very poor, feeble growth and developing no fruit buds. In the spring of 1900 I top worked a few cuttings on Bessemianka, and this year had three or four fine specimens of fruit on the grafts one year old This fine variety gives promise of being a success top worked on hardy stock, but undesirable on its own roots.

Bessemianka. Planted 1896 A Russian of very poor quality, subject to blight and undesirable where Flemish Beauty or Keiffer can be grown.

Fruit small and worthless unless it is used green for cooking or pickles.

Petite Margueritte Planted 1898. Has borne a few specimens for two years, and gives promise of being a very desirable early pear for home use. Fine, healthy and vigorous. Fruit small but quality good. Desirable.

Notes by G. C. Caston. (*Simcoe Fruit Station*)

Flemish Beauty is quite hardy here, but if you had a barrel of Bordeaux mixture under the tree and sprayed it every day you could not keep it clean I am top working with Bartlett, and they make excellent stock for that purpose. The Russian pears, Bergamot and Bessemianka, bear well, but the fruit has no quality to recommend it. They are only useful as stock for grafting good varieties on. Two trees that came here from Normal, Illinois, in 1896, under seal, and named "Sudduth" bore fruit this year, and it is no better than the Russians. It is as far behind our best pears as the Ben Davis apple is behind the Spy.

I have tried Dwarf Pears here on my own account outside of the experimental plot, and they have always failed. I would not advise anyone to plant Dwarf Pears in this section. My advice would be to plant Flemish Beauty and Russian Standards, and top work them with the best varieties of early, medium and late pears. Though I believe good orchard land will in future give better returns in apples than in pears.

Notes by R. L. Huggard. (*East Central Fruit Station.*)

Angell. A weak grower.

Bartlett Seckel. A slow grower; handsome fruit of good quality. October.

Belle de Esperan. Stocky, bushy, fruit round, small, no use here.

B. S. Fox. Fair grower, large medium yellow, slightly russett.

B Clairgeau. Fruit large, skin brownish red, good quality, productive, hardy. November and December.

Dr. Jules Guyot. Fruit large, handsome, of better quality than Bartlett, which it resembles. October 3.

Duchess of Bordeux. Fruit medium to large, a good keeping variety.

Dempsey. Four years planted, yield 22 fruits, growth 27 inches, a rapid grower of large fruit, smooth skin, quality very good. October.

Doyenne d' Ete. Four years planted, heavily loaded with fruit, a profuse bearer of small handsome fruit of fair quality, no use for the commercial orchard. July.

Dorset. Fruit large, smooth and handsome, healthy and hardy, a good new variety. September and November.

Eastern Belle. Yield 20 fruits, fruit medium, smooth, sweet and delicious; gathered fruit 16th of October.

Easter Beurre. Bearer of large fruit, skin rough, slightly russeted; quality good for a late pear. Keep till July.

Fred. Baudry. Only a medium grower, not yet fruited.

Flemish Beauty. Spots and cracks, not worth growing here.

Frederick Clapp. A fair grower, fruit medium to large, yellow with a red blush, white, of fair quality, very juicy when fully ripe. October 25.

Goodale. A medium grower, fruit large and even size; skin smooth, yellow when fully ripe. October 20. Quality fair to good, hardy.

Graslin. Spreading slow grower, good bearer, fruit large, rough, skin slightly russeted, red on sunny side, quality good. November 1.

Howell. One of the best fall pears, foliage thin, good grower and abundant bearer of medium to large smooth fruit of the finest quality; October. 15; requires thinning for best results, hardy.

Hoosic. Upright, stalky, fair bearer, fruit medium to large, dark green, quality fair to good. November 20.

Idaho. Upright, stalky, medium foliage, fruit medium to large, nearly round, yellow, rough skin, white flesh, quality medium to fair, November 1, good bearer.

Indian Queen. Vigorous grower, fruit medium, of good quality, hardy and productive.

Josephine de Malines Straggling, free grower, foliage light green, somewhat tender, fruit small, bell shaped, of good quality. January and February.

Keiffer's Hybrid. Very vigorous and exceedingly productive, large glossy leaves, fruit large, rather rough skinned, yellow, with blush when fully matured, quality fair to medium, good for canning, flesh white and firm. October and November.

Japan Golden Russet. Very upright, resembles Lombardy poplar, fruit medium, round, russet, with yellow skin and innumerable small dots, quality inferior. February.

Krull. Yield 4 fruits, October 1; a good grower, fruit resembling Louis Bonne de Jersey, but keeps later in season. October and November.

Koonce A rapid upright grower, with glossy leaves, somewhat pointed; healthy and hardy, fruit only medium, either as to color or quality. November.

La Lecteur. Fruit medium size, handsome, of fair quality. October 15.

Lincoln Coreless. Very thin foliage, glossy, fruit dropped prematurely.

Lady Clapp. Fruit yellow, resembling Clapp's Favorite, but smaller. October.

Leconte. Fruit large, yellow and abundant, with a decided quince flavor. November 1.

Lawson. Very upright and straggling, fruit very showy. quality poor. July 30.

Lawrence. Slow grower, hardy, fruit medium, green skin, somewhat rough, quality good. January and February.

PLUMS.

NOTES BY JOHN G. MITCHELL. (*Georgian Bay Fruit Station*)

AMERICAN PLUMS. Regarding these plums, I feel like passing a most sweeping condemnation on the whole list. Although some of them are of tolerable flavor, they are too small and unattractive in appearance to have any commercial value. The few baskets of them we ever shipped netted us nothing. Report sales read: "Wild plums not sold," and that was all we ever heard from them. The markets demand large and showy fruit, and we find there is no longer any use trying to grow anything but the best.

EUROPEAN PLUMS. *Arch Duke.* This plum is proving everything we said or expected of it. Tree, a moderate grower, a regular annual bearer; fruit, large size; color, black, covered with a heavy blue bloom; flesh, yellow; parts freely from the stone. A good shipper, and presents a fine appearance in baskets.

Monarch. This is likely to be one of the best late commercial plums. Tree, a fairly good strong grower; fruit, large; color, dark, covered with a heavy bloom, suture, distinct; flesh, greenish yellow, parts freely from the stone; quality, very good when fully ripe; one of the best shipping plums Season, last of September. Very promising.

Saratoga. Almost identical with Lombard. Fruit seems a little longer than the average Lombard; suture rather more distinct.

Tatge. Same as Lombard, but does not average quite as large. Lombard is the more desirable of the two.

Czar. A very pretty, medium sized purple plum; flesh, yellow; stone almost free. One of the earliest varieties, ripening immediately after Red June, about middle of August; quality, good. Tree hardy and apparently productive.

Japan Plums. This season's crop once more proves the ability of these plums to stand our climate. Most of them appear to be as hardy as the best European. They are strikingly handsome, and some of them are enormously productive. The following are among the most desirable, as far as tested here:

Abundance. Well named. Bore very heavily this season. The tree is a strong, upright grower. The fruit is large and very beautiful; color, yellow, or amber, overlaid on the sunny side with dots and splashes of red; flesh, extremely juicy, with a peculiar sweet, delicious, mellow flavor; too juicy for a good shipper. Ripe ten days before Lombard.

Burbank. One of the strongest, but the most spreading and sprawling grower in the plantation. Simply unequalled for productiveness. To produce the finest fruit, it should be severely thinned. The quality is fairly good, while its attractive color and good shipping qualities should recommend it as one of the best of the Japans. Ripe a week after Abundance.

Orient. A very handsome, symetrical grower and fairly vigorous. Fruit about as large as Burbank, and resembles that variety very much.

Red June. The earliest plum we have. Also one of the most desirable of the Japanese varieties. Tree, a strong grower, forming a large, well-shaped top, and bears the third year. Fruit, medium to large, conical in shape, bright red; quality, good. Season, about August 1st. Very hardy.

Chabot. A very strong grower, of a large, beautiful, stately top. Bears the third year. Fruit, about same size and shape as Red June, but not quite so conical; skin, amber, and nearly covered with red spots and markings; very attractive. Late September. Very hardy.

Hale's Japan. A handsome, upright tree. Fruit, larger than medium; color, yellow, well splashed with red, and covered with a most beautiful bloom, giving it a most attractive appearance. Rather a shy bearer, compared to other Japans, but best quality.

Although a good many of the Japanese plums are proving sufficiently hardy and of exceedingly attractive appearance, yet, as compared to our best European varieties, they are of such indifferent quality that we cannot advise the extensive planting of them. A few, however, could be planted to advantage. They would be a novelty, and, if judiciously selected, would more completely fill up or lengthen the season.

Notes by A. E. Sherrington. (*Lake Huron Fruit Station*)

Plums. There are now about forty varieties in this orchard and all are doing well, and making a strong and rapid growth. It is well fertilized, and kept well cultivated until the 1st of August. The pruning is done in early spring by thinning out any branches that are inclined to rub or cross each other, and all of the last season's growth are cut back from one-third to one-half per cent. and in some cases two-thirds. This system causes the trees to form a close compact head that will carry a crop of fruit without breaking; it also has a tendency to harden the tree and cause it to come into bearing at an earlier date.

The *Japan* varieties are still proving themselves to be hardy and early bearers with the exception of *Wickson*, which is rather tender; they are also very productive.

Abundance. Tree upright, spreading, vigorous and hardy; fruit, large; color, reddish purple; quality, good; yield per tree, ten baskets of twelve quarts; date of blooming, May 9; ripe, August 27. Six years old.

Burbank Tree spreading, vigorous and hardy; fruit, large, one and a half by one and three quarters; color, red, resembles Abundance, but does not soften when ripe like Abundance; quality, good; bloomed May 9; yield, nine baskets; ripe, September 5. Six years old.

Bradshaw. Tree not as vigorous as it might be; it is a hard tree to start in orchard but does very well after established, upright, spreading; fruit, very large; color, purple; quality, good; bloomed May 9; yield, one-half basket; ripe, September 5. Four years.

Golden Drop. Tree strong, upright, spreading, vigorous and hardy; fruit, large; quality, medium; color, yellow or light green; bloomed May 11; yielded two baskets; ripe October 1. Five years old.

Duane's Purple. Tree upright, spreading, vigorous and hardy ; fruit, large, one and three-quarters by one and three-quarters ; color, purple; quality, good ; bloomed May 8 ; ripe September 5 ; yield, one basket per tree Six years old.

Field. Tree, an upright grower, vigorous and hardy ; fruit, large, one and a half by one and a half : color, purple ; quality, good ; bloomed May 11 ; ripe September 6 ; yield, one and a half baskets. Four years old.

Guii. Tree upright, spreading, vigorous and hardy ; fruit, large, one and five-eighths by one and five-eighths ; color, dark blue ; quality, best ; bloomed May 11 ; ripe September 5 ; yield, one and a half baskets per tree. Six years old.

Grand Duke. Tree upright, spreading, strong grower, hardy ; fruit, large, one and a half by two inches ; color, purple with a heavy bloom ; quality, good ; bloomed May 9 ; ripe October 1 ; yield one and a half baskets. Four years old. This is a valuable late plum.

Gold. Tree, rather poor grower of spreading habit, appears to be hardy ; fruit, small to medium ; color, yellow, turning red at maturity ; quality, rather poor ; bloomed May 15 ; ripe September 20. Three years old ; yield, two quarts.

Hale. Tree, vigorous, upright, spreading, not quite as hardy as Burbank or Abundance ; fruit, large, one and three-quarters by two inches, some two by two inches ; color, yellow ; quality of the best ; bloomed May 9 ; ripe August 27 ; yield, three and a half baskets. Four years old. This is a very promising variety.

Imperial Gage. Tree, upright, spreading, forming a compact head, vigorous and hardy ; fruit, medium ; color, yellow ; quality, best : full bloom May 11 ; ripe September 9 ; yield, two baskets. Six years old. One of the best light colored plums.

Lombard. Tree of spreading habit, vigorous and hardy, inclined to overbear itself, needs thinning to give best results ; fruit, medium ; bloomed May 9 ; ripe September 17; yield, six and a quarter baskets per tree. Six years old.

Monarch. Tree, upright, spreading, strong, vigorous grower, forming a round compact top, hardy ; fruit, large, one and seven-eighths by one and seven-eighths ; quality, good ; color, purple with a fine bloom ; bloomed May 8 ; ripe September 20 ; two and three-quarter baskets. Four years old.

Pond's Seedling. Tree, upright, spreading, vigorous grower, but not as hardy as it might be ; fruit, very large ; quality very good ; color, reddish purple ; bloomed May 16; ripe September 20, yield, half basket. Four years old ; subject to rot.

Purple Egg. Tree, a good vigorous grower and hardy ; fruit, large ; color, purple ; quality, good ; bloomed May 15 ; ripe September 15; yield, two baskets. Four years.

Quackenbos. Tree, upright to spreading, vigorous and hardy ; fruit, very large, one and three-quarters by one and five-eighths ; color, dark blue ; quality, good ; bloomed May 11 ; ripe September 9 ; yield, one and a half baskets. Six years old.

Red June. Tree, strong, upright, vigorous grower ; fruit, large, one and three-quarters by one and half ; color, dark red ; shape, oblong with sharp point ; saturam, distinct; quality, good ; pit, medium ; bloomed May 7 ; ripe August 15 ; yield, six quarts. Two years old ; a good keeper.

Spaulding. Tree, upright to spreading, vigorous and hardy ; quality, good ; flavor, very sweet ; fruit, medium size ; color, greenish yellow ; quality, good ; bloomed May 9; ripe September 6 ; yield, six baskets. Six years old.

Shipper's Pride. Tree, upright, strong, vigorous grower ; fruit, large ; color, purple; quality, very good ; bloomed May 16 ; ripe September 14 ; yield, two baskets per tree. Six years old.

Satsuma. A strong, vigorous grower, upright, spreading, hardy ; fruit, large, two by one and half inches ; color, dark red, when cut open it is about the color of a blood beet ; quality, first-class ; bloomed May 11 ; yield, two baskets per tree. Four years old. This promises to be one of the best of the Japan varieties.

Victoria. Tree, vigorous and hardy ; fruit, large, one and five-eighths by one and three-quarters ; color, yellowish, turning red or mottled when fully ripe, September 6 ; yield, six baskets. Rotted very badly or the yield would have been much greater.

Washington Tree, a good grower, hardy ; fruit, large and of the best quality ; bloomed May 10 ; ripe August 28 ; yield, four baskets. Ten years old. A fancy plum.

Wickson. An upright grower, forming a very close head, rather tender ; fruit, very large ; color, red ; quality, very good ; bloomed May 11 ; ripe September 20. Five years old.

Notes by Harold Jones. (*St. Lawrence Fruit Station.*)

The plum orchard was plowed early in May and given clean cultivation, with frequent harrowing, to July 18th, when it was sown to red clover, which has made a good growth, and now gives a good covering over the entire ground.

All the trees came through the winter in good condition, and there were no losses excepting the Japan plum Kelsey.

Blossom buds of the following European varieties perished during the winter. Lombard, Communia, Tatge, Grand Duke, Hughes' seedling, Moore's Arctic, Saunders.

European plums in bloom : Shippers' Pride, Yellow Egg, Genii.

The following Japan blossom buds perished : Abundance, Burbank, Blood, Normands, Birkmans.

Japan plums in bloom : Gold, Maru, Ogon.

American plums in bloom : Wolf, Wyant, Forest Rose, Forest Garden, Hammer, Chas. Downing, Rockford, Whitaker, Col. Wilder, Milton, Weaver.

The trees were in bloom a few days earlier than in 1900, and we had no frost to injure the blossoms, but I did not have a single plum come to maturity. The continued wet, cool to cold weather through May injured the blossoms to such an extent that they turned yellow and fell off in all varieties.

The trees have made a good growth, but suffered from the attacks of shot hole fungi and aphis. In many cases the foliage began dropping early in September, principally on European varieties.

From my experience with plums during the last few years I believe they are much more sensitive to sudden changes of temperature, particularly the fruit buds, than either apples or pears.

The new additions to my plum list planted in the spring of 1901 are : "America," 3 trees from A. M. Smith ; "Emerald," 3 trees from E. D. Smith, and two trees each of plums, No. 53 and 54, very kindly sent me by Mr. Dunlop, Secretary of the Quebec Pomological Society.

These trees will likely prove to be a very valuable addition to my collection. I understand that these trees are known as Dunlop's seedlings, are of European origin, and are seedlings or suckers taken from trees in the priests' gardens on Mount Royal, where they have been grown and propagated for centuries and have become acclimated.

Notes by G. C. Caston. (*Simcoe Fruit Station*)

Of all the plums tested here, *Burbank* is far and away the best in point of profit. *Abundance* planted at the same time does not come anywhere near it. *Red June* has done well. It begins to bear almost as soon as planted, and bears every year ; the fruit is large and fine. Three trees planted in 1897 gave this year nine baskets of fine plums. *Ogon*, a large, handsome, yellow plum, is somewhat disappointing. It develops a very astringent flavor when canned. Probably this might be remedied by removing the skin, but few would take the trouble to do this when there are so many good plums. Most of the *Prunus Americana* varieties are very little better than our old natives. I am going to top work these with something better.

Shippers' Pride, *Middleburg* and *Monarch* fruited heavily this year. For an extremely late variety, the *Hudson River Yellow Egg* would fill the bill. I have one tree that was sent here in 1895 under that name, and it did not ripen this year until the 1st of October. *Willard* bore a good crop, but I have a poor opinion of its quality.

If I were confined to two varieties I would plant Red June and Burbank.

The choicest varieties for canning, out of some thirty varieties tested here, are *Peter's Yellow Gage* and *Prince's Yellow Gage*, but they are too tender for this section and lack in vigor. I am going to try them top grafted on something hardy.

NOTES BY M. PETTIT. (*Wentworth Station*).

Plums Forty eight varieties of plums have fruited at this station. The most profitable have been Bradshaw, Washington, Duane's Purple, Lombard, Yellow Egg, Grand Duke, Reine Claude, and Monarch.

Of the Japan varieties, Red June, Abundance and Burbank; Red June on account of earliness and high price; Abundance, and Burbank, on account of heavy crops. The only variety of no value is Caradus. Three trees were planted in 1894; have made good growth, and not yet produced a basket of fruit.

FERTILIZERS. Careful experiments have been made on apple, pear, and plum trees, and grape vines, with stable manure, ashes, the Thomas Fertilizer, and the Smith's Falls Fertilizer, with no results (compared with the soil where none has been applied) that would guarantee the profitable use of any of them on heavy land. The best results from any kind of fertilizer that I have seen are on the farm of W. M. Orr, Fruitland, where rye, rape, etc., have been plowed under for some years; the soil is in fine condition and the fine crops of fruit and wood growth plainly show the results.

RASPBERRIES.

NOTES BY A. E. SHERRINGTON. (*Lake Huron Fruit Station*)

RASPBERRIES: *Carpenter's Early Plant*, a rather weak grower and tender, fruit, small, quality only fair, color black, ripe July 12th, last picking July 20th, yield 2 lbs. 2 oz.

Brandywine. Plant a poor grower, weak in constitution, has just about died out, fruit small, quality very good, color red, ripe July 12th, yield 5 oz., not profitable.

Caroline. Plant, vigorous, healthy and hardy, fruit small, quality poor, very soft, color yellow, ripe July 16th, yield 3 lbs., not worthy of cultivation.

Conrath. Plant, strong, vigorous, healthy and hardy, fruit large, firm, and of good quality, color black, ripe July 16th, yield 6 lbs., 2 oz., one of the best blackcaps.

Cuthbert. Plant, a very vigorous grower, canes have grown this season to the height of seven feet, it is also hardy, although it was damaged somewhat last winter, it was owing to a late fall growth. Fruit large and firm, quality of the best, color dark red, ripe July 18th, last picking August 5th, yield 8 lbs. 8 oz.

Columbian Plant, vigorous, strong and healthy, but not hardy enough for a standard variety, fruit large, firm, quality good, color purple, ripe July 22nd, yield 6 lbs., not a good market berry on account of color.

Marlboro'. Plant strong, but of dwarfed nature, growth about thirty inches high, not as hardy as it ought to be, fruit large, fine, quality good, color bright red, ripe July 12th, yield 10 lbs., 2 ounces, a good market variety owing to its earliness.

Sheffer. Plant very vigorous, but tender; this berry is of the cap variety, propagates from the tip, fruit large, quality good for canning, color purple, ripe July 16th, yield 7 lbs.

Smith's Giant. Plant vigorous, a little tender but a very profitable variety, fruit very large, quality good, color black, ripe July 24th, yield seven pounds two ounces.

Souhegan. Plant fairly vigorous but tender, fruit large, quality very good, color black, ripe July 16th, yield four pounds five ounces.

BLACKBERRIES. The demand for this fruit is very limited, consequently it will never be a profitable crop for the fruit grower, and it seems to take several years to get the plants established; there are also a number of varieties that are not worth planting such as *Maxwell*, *Child's Tree Berry*, *Erie* and *Wachusetts;* those four varieties have been planted four years, but have never yielded a half pound of fruit yet.

Ancient Briton. Plant fairly vigorous, hardy and healthy, fruit medium size of rather poor quality, ripe Aug. 6th, last picking Aug 24th, yield four pounds five ounces.

Agawam. Plant a strong, vigorous grower, healthy and hardy, suckers sufficient to make a good row, fruit large, quality good, flavor agreeable, ripe Aug. 24th, last picking Sept. 1st, yield nine pounds five oz. This is one of the best.

Early Cluster. Plant a vigorous upright grower, but tender for this section, fruit large, quality good, flavor very good, ripe Aug. 12th, last picking Sept. 1st, yield six pounds seven oz.; instead of it being early I would say it is the latest one to ripen in the plot.

Erie. Plant rather poor grower, weak and tender; with the exception of a dozen berries on it, it has never yielded any fruit.

Eldorado. Plant a strong, vigorous grower, healthy and hardy, fruit large, quality good, flavor first class, ripe Aug. 1st, last picking Aug. 24th, yield ten pounds six ounces. This is a very profitable one.

Gainor. Plant a vigorous, strong grower and hardy, fruit very large, quality good, ripe Aug. 1st, last picking Aug. 24th, yield nine pounds three ounces. A very promising one.

Lucretia Dewberry. Plant of a trailing habit, will make as much as ten to twelve feet of a growth in a season, the way it is grown at this station is by letting the canes run along the ground as they please during the summer. In the spring the old canes are cut away and the new canes are trellised up on wires like a *Grape Vine*, in that way it is really ornamental when in bloom, also when loaded with fruit. Fruit large and quality very good, ripe Aug. 1st, Aug. 24th, yield eight lbs. five oz.

Maxwell. Plant a poor weak grower and tender, does not fruit here.

Ohmer. Plant strong, vigorous and hardy, fruit large, quality very good, ripe Aug. 1st, last picking Aug. 24th, yield seven lbs. five oz.

Synder. Plant strong and vigorous, healthy and hardy, fruit small to medium, rather firm, quality very good, ripe Aug. 1st, Aug. 15th, yield seven lbs.

Stone's Early. Plant vigorous, hardy and productive. The plants of this variety were affected with the *Red Rust*, those were dug up and burnt; this leaves only half the number of plants, consequently the yield is lower, fruit large, quality good, ripe Aug. 12th, last picking Aug. 15th, yield four lbs two oz.

Stone's Hardy. Plant fairly vigorous, healthy and hardy, fruit medium size, quality rather poor, ripe Aug. 12th, last picking Aug 24th.

Taylor. Plant strong and vigorous, healthy and hardy, fruit medium to large, quality very good, ripe Aug. 1st, last picking Aug. 26th, yield six lbs. two oz.

Western Triumph. Plant rather poor grower, weak and a little tender, fruit small, rather dry and hard, ripe Aug. 1st to Aug. 15th, yield six lbs twelve oz.

Wilson Junior. Plant a poor weak grower, rather tender, fruit large, fine quality, ripe Aug. 1st to Aug. 24th, yield five lbs. two oz.

STRAWBERRIES.

NOTES BY E. B. STEVENSON. (*Strawberry Sub-Station.*)

In this district the season was on the whole favorable; though opening with a very wet cold May, causing to some extent imperfect fertilization of the blossoms, some kinds suffered in this respect more than others, the Williams was particularly noticeable in this respect. At one or two pickings of the Williams a very large percentage of the berries were very imperfectly formed and not saleable. This long wet cold period was followed by some of the hottest days I ever remember, so hot that many pickers had to give up, during the middle of the day, overcome with the heat. Notwithstanding those drawbacks the crop was a good one and prices fair. I have been more than ever confirmed in my opinion as to narrow rows making the most profitable returns, for the grower. I am pleased to find that some of the large growers are following that method. One grower said to me only the last week that he was now well convinced that to plant the rows closer together say three feet apart, and let the rows grow to the width of fourteen or sixteen inches, cutting all other runners off, there was the most money in that way of growing strawberries; the fruit was larger and finer and more of it on the same space of ground, than with wide matted rows in which the pickers had to tramp on and smash many of the best berries.

This is the view I have held for years, and have advocated year after year in my report. I am satisfied that the grower who once gives it a fair trial will never pursue any

other method of growing strawberries. Let me repeat former instructions on this point; you know "line upon line and precept upon precept" is necessary in all lines of life. After the ground is thoroughly prepared, choose good, strong, healthy plants that have never fruited. Do not expose the roots to sun or wind. Never allow the roots to become dry; this is very important.

The plants carefully set just as soon as the ground is dry enough to work easily, then begin to cultivate. I would cut off all blossoms just as soon as they appear. There are many growers and nurserymen who advocate cutting the runners off also until the middle of July. I have found that by that time in our country we generally have a season of hot dry weather, in which the runners will not take root, unless they are set in; or a stone, or clod of earth, placed on them. The reason they give for removing the first runners is that it strengthens the parent plant. I grant that, but if your plant is what it ought to be when you set it out, viz., a strong, healthy plant, it is strong enough to go to work just as soon as it recovers the shock of removal, and this it does very soon, if it is transplanted as early as the ground will permit; it will very soon throw out several strong runners, that will in turn send out others, these well rooted; which they will be before the hot dry time comes on, and your ground in proper shape and heart; will go on growing all through the hot time, making fruit crowns and storing up strength to mature the crop of next season. When the row is sixteeen or eighteen inches wide, I would then cut off all runners. You will thus have with rows planted three feet apart—eighteen inches of plants which will be in a position to produce the finest fruit; and you will have eighteen inches of path for the pickers to use in picking, so they will not need to step on any of the fruit. It is gratifying to learn that some of the largest growers in this strawberry section are following this method, and finding it pays the best.

The crop was a good one considering all things, and lasted for about five and half weeks, from June 10th, where the first berries of the August Luther, were picked until July 15th, when the last of the Gandy and Hunn, Brandywine, Jersy Queen, and others, were picked ending the season.

The first ripe was the August Luther, on June 10th, followed by Michel and Van. Deman June 12th, Johnstons early, first ripe June 14th, followed by Senator Dunlop and Clyde on June 15th, we had showers on June 18th, and 19th, and a good soaking on morning of 20th, followed by great heat on 27th, 98° F., in the shade and continued for a week very hot.

The Miller, was ripe June 21st, followed on the 22nd by Williams, Saunders, Emperor, Empress; Brandywine on the 24th.

On July 3rd, first of Gandy ripe and still picking Senator Dunlop and Miller. Michel ended up on July 1st.

I have been particularly pleased with the showing of some of the new varieties viz., August Luther and Miller and Senator Dunlop.

There is quite a difference of opinion as to which is the earliest variety, the contest appears to be between August Luther, Michel, Excelsior and Johnston's Early. With me the August Luther was first ripe, I had it planted side by side with Michel and Johnston's Early, under same conditions, had only same care and attention on the same soil, when spring came, the Michel was in bloom three days before the August Luther; but when fruiting time came, the first ripe was August Luther, two days before the Michel, which came next. So that it would appear that it takes the August Luther several days less time to mature and ripen its fruit from blossom time than the Michel; that in my opinion is a distinct advantage for being in bloom two days behind the Michel, it may miss one of the late frosts that so often damages the Michel; and then ripen its fruit much earlier than the Michel under those conditions. This season there was a frost, a light one, but it did no injury to speak of to the early berries; it cut a flower or two in some places.

For those who desire fine fruit perhaps neither of these varieties would satisfy them. No doubt the only reason for growing them is the gain for one or two pickings of the high prices obtained for the first berries grown at home. These are followed so closely by Senator Dunlop, Clyde, Bubach and Haverland, that in some seasons there is very little difference in their time of ripening, but which in most soils are very much more profitable. It remains for each grower to try the varieties on his soil, and thus find out which is most profitable for him to grow. Now in many places the Michel is discarded as very unprofitable, while here in this section on some places it is very profitable, bearing a good crop

of very early berries. Following the instructions from the Board we have discarded many varieties that have been tested and proved useless, and thus cut our list of 250 down to one half, having now only some 120 in that plot, some of them new ones received last spring, as follows:

New Ones Bobolink, Blonde, Challenge, Carmi Beauty, Corsican, Hero, 11.59 P.M., Honest Charlie, Joe, Marie, Minute Man, Nellie, Robbie, Sampson, Monitor, Uncle Jim, Up to Date, Yaut. Most of these have made a good growth; will be able to report on them fter fruiting.

Early and Extra Early Varieties. August Luther, Michel, Van Deman, Johnston's Early, Excelsior, Smith's, Clyde, Marshall, Staples, Beder Wood, Lord Sheffield, Senator Dunlop.

Second Early to Mid-Season. Haverland, Bubach, Seaford, Miller, Tennessee, Prolific, Nick Ohmer, Sample, Ruby, Splendid, Glen Mary, Kansas.

Among the best of the late varieties are Aroma, Brandywine, Gandy, Hunn, Margaret, Saunders, Williams, Woolverton, Klondike, Jersey Queen.

No grower can go wrong in planting any of the above kinds as they have proved successful on most soils, with one or two exceptions.

I will now give a short description of each variety fruited the past season. Our soil here is a sandy loam, this is the first crop of strawberries grown on it. This also is important. Strawberries do not do well after being grown on the same ground for several years. Something has been taken out of the soil that they need. So that no variety will run as well on such ground, nor bear as much or as fine fruit.

Aroma. (Perfect.) A strong, healthy plant; good grower; ripens a little earlier than Gandy but picks longer covering a longer season. It disputes with Gandy the place of "best late variety."

Annie Laurie. (Perfect) Good, strong, healthy plant; fruit, large, beautiful looking; finest quality; does not have enough berries to make profitable for market.

August Luther. (Perfect.) Is a healthy, vigorous grower, as much so as the Michels; plant is very productive; resembles the Michels, but larger, with a slight neck; ripens all over at once. One of the best extra early varieties if not the best. I would recommend all to give it a trial.

Bubach No 5. (Imperfect.) This old standard is still one of the best for the near market, the berries are so large and bright, and the plant very productive, but weakening somewhat; does not run as well as it did years ago.

Bennet. (Imperfect.). One of the newer sorts; did well; plant, healthy grower; good runner. Report fully after another trial.

Bismarck. (Perfect.) Plant, healthy; good grower; resembles its parent the Bubach; berry, large, round and bright, with golden seeds, and quite productive; a profitable sort.

Brandywine. (Perfect.) Plant, healthy; one of the strongest growers, in fact a rampant runner; the berry is large, dark color and firm; very good quality; will ship well; not quite as productive here as in some places.

Beder Wood. (Perfect.) Plant, strong, healthy; good runner; early to very early in time of ripening; quite productive; large; one of best very early kinds; a good pollenizer for early pistillates

Clyde (Perfect). Plant strong and healthy, a good grower; makes a good row; berry is very large and plant very productive; the best variety for a near market. It did very well the past season, is being largely planted; it is early, being ready to pick with the second or third picking of Michels

Clyde No. 800. (Perfect) This is a seedling of Clyde. Plant is healthy, good grower; berry is large, conical; firm, good quality and plant productive; a good variety.

Cobden Queen. (Perfect). A good, healthy grower; did well the past season.

Downing's Bride. (Imperfect). A good, strong, healthy grower, making plenty of plants; berry is large, good color, conical shape, is a bright, glossy berry, a beautiful berry to look at; worth a trial.

Earliest. (Perfect). A second Michel, cannot distinguish between them.

Excelsior. (Perfect). This variety has done well this year; it is healthy, good runner, making wide row. It has been very highly spoken of in some places as one extra early;

it is early and is worth a trial. It has not done as well with me as some of the other extra early kinds.

Emperor. (Perfect). This is a good grower; plant healthy, no rust, did well the past season; berry bright, sometimes a little irregular, large in size, fairly productive. For those who like large, fine fruit this is a good one.

Empress. (Perfect) Both this and Emperor are seedlings of the late John Little, and are evidently of the same parentage This variety is very like the Emperor, somewhat darker in color; produces some large, fine fruit; a good one for amatuers, will give them satisfaction.

Geisler. (Perfect). This is a very early bloomer, would be a good one to fertilize the early pistillates; the plant is strong and healthy; the berry is large, good color, worth growing; did well this past season.

Gibson. (Perfect). Plant a strong one; a good runner, make a fine wide row; the berry is quite large, roundly conical, good quality; well worth trying, it is firm and I think would ship well.

Glen Mary. (Perfect). This has again proved to be a good one; plant very large, strong and vigorous, quite productive, berries large to very large, somewhat ribbed and green, seedy end. Not of best quality, but firm and will ship; profitable to grow.

Grenville. (Imperfect). Plant makes many runners, the leaves curl up somewhat, which some do not like, but that does not seem to interfere with its productiveness; good cropper; resembles its parent the Bubach, not as large though; it is a profitable variety to grow.

Gladstone. (Perfect). Plant very large and strong; good grower, healthy foliage; berry quite large, ripens mid season; it would appear to require a rich moist soil to do its best; worth a trial by those who have such.

Haverland (Imperfect). This is one of the standards, is still a vigorous grower; healthy plant and very productive; the berries are long, large, bright, fine looking in the basket, sells well; is one of the best. The Clyde is a good one to fertilize it with as they bloom at the same time.

Hunn. (Imperfect). A strong, vigorous grower; sometimes the plant rusts a good deal. It is very late in ripening its fruit, even later than the Gandy; the fruit is dark, roundish, firm and good quality; one of the very late kinds growers are looking for.

Jersey Queen. (Imperfect). Plant is healthy, fair runner, making plenty of plants; very late in ripening, one of the best late sorts. The fruit is large, round, bright color, firm, quality good; profitable for market.

Johnston's Early. (Perfect) A cross between Crescent and Hoffman; the plant is small, healthy, only fair runner on my soil; the berry bright red, not as sweet as August Luther but good, acid flavor, fairly productive; will give another trial.

Jerry Rusk. (Perfect). Plant healthy, stools out strong and healthy; berry is large, roundly conical, bright color, somewhat like its parent the Bubach; good flavor.

Klondike. (Perfect). Plant strong and good grower, but shows some rust; makes a fair row; it is a late variety and is worth a trial as such.

Lovett. (Perfect). Strong, healthy grower; foliage dark color, good runner; has a little rust sometimes; productive, berry conical; good color, bright, quality fair; does very well in some places; much like the Williams and Saunders. Of the three varieties I prefer the Saunders; they are all of the same season and a good deal alike in appearance.

Lee. (Perfect) Plant, healthy, good runner; berry long, conical, acid, large, medium in produciveness, will give further trial.

Lord Sheffield. (Perfect.) An English variety, belongs to the very early sorts. Plant a good runner, makes many plants, but rusts somewhat; the fruit is round by coni-; bright red, good color, large, and plant quite productive; an early kind, well worth growing.

Margaret. (Perfect.) The plant is strong and a good grower, healthy, wants a good rich soil and will repay any such grower; berry, large and fine, quite productive, well worth growing.

Miller. (Perfect.) Plant, very large, strong and healthy, makes plenty of runners, which are very thick, no trace of rust on the plant; berry, large, conical, somewhat ribbed like Glen Mary, solid, quite firm; bright red in color; flavor slightly acid; large hull; season, medium to late. A good one, judging from one year's fruiting.

Marshall (Perfect.) This is one of the very large and early sorts that amateurs like to grow; it wants rich and moist soil to do well; not as profitable for market growing as Clyde and some others.

Michel. (Perfect.) This is so well known that I need not describe it. It is profitable in some soils on account of its earliness and is a good shipper. It suffers sometimes from late frosts. Some of the growers here say it pays them as well as any other kind.

Maximus. (Perfect.) Plant, large and healthy, good grower. The berry is large, but has not been productive enough to suit me so far. Will give it another trial.

Morgan's Favorite (Perfect.) Plant is healthy, good grower, quite productive; berry, large, much shape of the Woolverton and same flavor, but firmer and not so dark in color; well worth a trial.

McKinley. (Perfect.) Plant, healthy, good grower, makes plenty of plants; berry, large, dark red, ribbed like the Glen Mary, medium in firmness, good flavor, fairly productive.

New York. (Perfect.) Plant large, strong, healthy one; a good grower, fair runner; berry, medium to large in size; mild flavor; well worth a trial.

Nick Ohmer. (Perfect.) Plant, healthy, strong and vigorous, good plant maker, that easily roots; berry is large, glossy, very firm and best quality; resembles in appearance the Sharpless; a good one; worth a trial by all.

Parson's Beauty. (Perfect.) A good, healthy plant, fair runner; berry, conical, bright red; yellow seeds, mildly acid, medium in firmness; quite productive; will be, I believe, a good market variety.

Pride of Cumberland. (Perfect.) Plant, healthy, good grower; makes fair row; medium in size; the berry is large and firm and quite productive, worth trying; a good, large, bright variety.

Pennell (Perfect.) A good one. Plant, healthy, good grower; berry, large, round, with a neck; good quality, firm, fine in quality; well worth trying.

Ruby. (Perfect.) Plant, good grower, but has some rust; quite productive; fruit, conical, large and quite firm and fine flavor; season medium; worth growing.

Rough Rider. (Perfect.) Plant, healthy, shoots out like Parker Earl, does not make many plants, productive, late; berry, large, somewhat irregular in shape, fair flavor; did not do as well as I expected, might have been owing to the very hot weather at its fruiting time.

Smith's Seedling. (Perfect.) Plant, small, healthy, fair runner, extra early, picks with the Michel; berry, medium in size, fairly productive; a good, extra early variety; well worth a trial.

Saunders. (Perfect) This is one of the best market varieties for mid-season to late. Plant, strong, good grower, making lots of plants. In my opinion, it is better in every way than the Williams. It is a Canadian berry, grown by the late John Little. The berry is conical, large, bright, firm and good quality, much finer than the Williams. ripens all over better, is as good a shipper as the Williams.

Sunshine. (Imperfect.) Plant, somewhat like the Crescent, great grower; plant, healthy, late fruiting. It has done fairly well, but would like to see it fruit another year before deciding as to its qualities.

Salem. (Perfect.) Plant, medium in size, healthy, good grower, makes good row; berry, roundish, medium to large in size, fair quality; will give another trial.

Seaford. (Imperfect.) Plant, a strong and healthy grower, making plenty of plants; the fruit is large and firm, bright, glossy red and best quality; plant is very productive; it is a good one for the market grower; season, ripens about time of Bubach, and is among the last to pick.

Senator Dunlop. (Perfect.) Plant of the Crescent type, rampant runner, healthy, quite productive; berry, conical, bright, glossy, dark red, yellow seeds; solid and firm; large green hull; berry is good quality; medium to large in size; it ripens with the Clyde. I believe it will be a very valuable market variety; would advise a trial of it by all growers.

Sharpless. (Perfect.) Well known; it did well with me; the fruit is firm and of best quality, but does not bear enough for the market grower.

Star. (Perfect.) Plant large, healthy, good runner ; it is a good one for amateurs to get ; very like the Sharpless.

Splendid (Perfect.) Here is a good early large sort ; plant healthy, vigorous grower, making lots of plants ; berry is large, round, good color, firm ; very productive; a good market variety ; well worth a trial.

Fred Stahaline. (Imperfect.) Has some good points ; healthy, good runner ; berry, roundish ; fair quality ; lots of other better kinds.

Sample. (Imperfect.) Plant is healthy, good grower ; berry is large and bright ; rather soft and poor quality ; it is productive and well worth a trial.

Tennessee Prolific. (Perfect.) Here is another good market berry ; large cropper ; plant is healthy; makes lots of plants; quite productive ; berry, good size, bright red, firm; good reports of it wherever grown ; worth a trial.

Vera. (Imperfect.) Plant, crescent type ; healthy, good grower, free from rust, very productive ; berry, conical, fair size, bright red, firm and good flavor ; a good one.

Van Deman. (Perfect.) Plant, good grower ; has some rust but makes a good row, productive ; one of the earliest and runs through a long season ; best quality ; berry, large and firm ; a good early.

Warfield. (Imperfect.) Plant, small, good grower, making many plants, healthy and very productive when it has moisture enough to mature its load of fruit ; suffers from hot, dry weather.

Wm. Belt. (Perfect.) Plant, good grower, but sometimes rusts quite a lot, but makes plenty of plants ; the plant is productive ; berry is large, sometimes a little irregular, but bright red, fine looking, firm and good flavor ; it has done well with me, and is well worth trying.

Williams. (Perfect.) Well known ; a good market sort ; plant, good grower, but sometimes has rust on it ; berry, conical, has green tip, is firm and ships well ; grown largely in this section. In my opinion it is not as good as the Saunders.

Woolverton. (Perfect.) Plant, large and strong, a good grower, making a fine row, very healthy, no trace of rust on it ; blooms very early ; berry is very large, mild but pleasant flavor ; medium to late in season ; a good fancy variety.

The lists I have given above are in my opinion the choice of the kinds now before the public. To say which particular variety will suit best the different soils would be entirely out of the question. Each grower must determine that matter for himself. The past growing season has been very dry and hot here. I notice the plantations on new land have done very well. On plots where the ground has been in crops longer the stand of plants is thin, and in some of the rows have large vacant spots. Mine have done very well. I have been cutting off the runners for a couple of months, so as not to let the rows get too wide. I planted early and let all the runners root at first until my row was wide enough ; then I began to cut runners, and I have perfect rows for next season's fruiting, while some others who have pursued a different method have a very poor stand of plants with some rows having many vacancies.

ONTARIO'S FRUIT AWARDS AT THE PAN-AMERICAN.

Considering the season, our exhibt of fruit from the Fruit Stations of Ontario was an excellent one, and at the close a selection was forwarded to the Pan-American Exposition at Buffalo by the Secretary, where, under Mr. Orr's supervision, it was placed on the tables and duly labelled.

A silver medal was given this collection by the American Pomological Society ; and, later, another silver medal was awarded it by the Exposition.

Map showing relative situations of the Ontario Fruit Stations.

REPORT

OF THE

INSPECTOR OF FUMIGATION APPLIANCES

1901.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

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TORONTO.

REPORT

OF THE

INSPECTOR OF FUMIGATION APPLIANCES.

1901.

To the Honorable John Dryden, Minister of Agriculture:

Sir,—I beg to submit herewith my third annual report as Inspector of Appliances for the fumigation of Nursery Stock.

The fumigation system has now become well established in all our nurseries. Better fumigation houses are being erected, and greater attention is being paid to the process of fumigation than in previous years. I believe, moreover, that the great majority of nurserymen now realize that the enforced treatment of their nursery stock with hydrocyanic acid gas, although at present slightly troublesome and expensive, will eventually be money and time well spent. Already some of them boast of their superior equipment for fumigation, and advertise their stock as being thoroughly treated with hydrocyanic acid gas, so that buyers of their stock run no risk of introducing the San Jose Scale.

In view of the fact that the San Jose Scale, instead of being stamped out, has actually increased the past year, nurserymen cannot, for some time to come, expect that the regulations for the proper performance of fumigation of nursery stock will be less strictly enforced than formerly. As a matter of protection, I would urge that even greater precautions than ever be taken to have fumigation done properly at all the nurseries, for the nursery trade of this Province is at stake. Last spring Nova Scotia had an expert Inspector examine all imported nursery stock for San Jose Scale, and were live Scale to be found on any tree sent from Ontario, a prejudice would soon arise which would be almost fatal to our nursery trade with the Maritime Provinces.

British Columbia, too, is exerting her utmost care to have San Jose Scale excluded from her territory, and is enforcing a rigid examination of all imported stock. Our nurserymen, then, cannot be too careful of their shipments to these Provinces if they wish to retain their reputation.

Besides, our own fruit-growers are awakening to the fact that the San Jose Scale is no ordinary orchard pest, and are demanding protection from it in the purchase of new trees.

Inspection.

As in previous years, much attention was paid to the inspection of fumigation houses and boxes. In many cases permits were not granted until considerable repairs had been made and the houses made strictly air-tight. Every house was tested before permission was given to fumigate.

As already stated, good permanent houses are gradually superseding the temporary structures which were erected at first.

Too frequently, however, the owners of houses delayed making repairs until the arrival of the Inspector, and the result was the loss of considerable time occasioned by a second visit. Hereafter, the Inspector will not be so lenient, and will not make a second visit.

Notices were sent to every nurseryman intimating when he might expect a visit from the Inspector, and asking him to have his house in readiness for the test. In future the Inspector will warn by post the nurserymen at least a week prior to his visit, and will require that all repairs which were suggested at last visit, be made and that the house be ready for fumigation.

The main burden of the Inspection work fell upon Mr. W. N. Hutt, B.S.A., who has been my faithful assistant for the last two years. I cannot praise Mr. Hutt too highly, for he performed his work with great tact and firmness.

With the exception of the Eastern and some of the Niagara nurseries, which I myself inspected, most of the nurseries were inspected by Mr. Hutt. I at-

tended to the distribution of the chemicals from the Agricultural College, Guelph, and this is no slight burden at a busy season at the College.

More attention than ever will be given this coming year to the matter of proper fumigation, and efforts will be made to introduce the latest improvements, such as those suggested by Professors Sanderson and Penny, and described in a later section of this report.

The Hon. Minister of Agriculture for Canada gave us permission to inspect the Fumigation houses under his charge at Windsor and Niagara Falls.

An inspection was accordingly made, and after a few improvements had been effected the tests showed them to be reliable. These houses on the border are important, as all shipments of nursery stock from the United States must pass through them.

The Equipment for Fumigation

The equipment necessary for the fumigation of nursery stock consists of :

1. Chemicals, including water, sulphuric acid, and potassium cyanide (98-99 per cent pure).

2. Generator, or some suitable vessel, jar or crock, in which to mix the chemicals and generate the hydrocyanic acid gas.

3. A graduated glass beaker for measuring out the acid and water, and

4. Air-tight fumigation house, or box, to hold the stock while fumigation by gas is taking place.

The chemicals, with the exception of the water, are sent from the Agricultural College to the nurserymen in weighed and measured quantities, suited to the capacity of the fumigation houses or boxes. Great care should be taken with the chemicals, for the acid is deadly corrosive, and the cyanide is deadly poisonous. They should be kept out of the reach of children.

The generator may be a glazed earthenware crock or pickle jar, of 1 to 4 quarts capacity, according to the size of the house. After a charge of gas has been liberated a bluish liquid will be left in the generator, but will crystallize out as it cools. These contents are readily soluble in water, and should be emptied as soon as possible in a manure pile, but never in an exposed place. One nurseryman to my knowledge lost two good sheep by exposing the jars with the contents to these animals.

The generator should never be made of tin or iron; always use glass or earthenware, never the cyanide tins.

The Fumigation. As soon as the trees are dug and tied in bunches they are piled loosely on the floor of the house or box, with roots towards walls, and tops overlapping. When everything is ready, the water is measured out into the generator, then the acid is slowly poured into the water and kept stirred with a stick; finally the cyanide is dropped into the liquid from the tin or paper (as the directions state). The door, or lid, is immediately closed, and the room made perfectly air-tight. The doors are thrown open again in 45 minutes, and the buildings thoroughly ventilated for about 10 minutes.

It is very important that the roots of the trees be exposed for as short a time as possible, both before and after the fumigation process, for it is essential that they should remain moist. The roots, however, should not be puddled before fumigation.

Trees, especially peach, should never be fumigated a second time, nor should they be fumigated when they are drenching wet. Damp or moist trees, however, are not injured by the treatment.

Instructions sent to Nurserymen

The following circulars were issued during the year :

Memo for the Guide of Nurserymen in the Fumigation of Nursery Stock.

1. The formula to be used for apple, pear, plum, cherry, quince, shrubs and vines: Cyanide, twenty-five-twenty-eighths of an ounce; sulphuric acid, 1¼ fluid ounces; water, 1⅞ fluid ounces, for every 100 cubic feet in house or box.

2. The formula to be used for peach, Japan plum, raspberry, gooseberry, currant: Cyanide, ⅔ ounce; sulphuric acid, 1 fluid ounce; water, 1½ fluid ounces, for every 100 cubic feet in house or box.

3. The following plants do not require fumigation: Evergreens, strawberry plants, bulbs and tubers, herbaceous perennials and bedding plants.

4. Damage may be done to stock (a) if fumigation takes place too early in the fall, before the buds are set, and the wood sufficiently dormant, and (b) if fumigation takes place late in spring, after the buds have begun to swell.

5. The roots of stock should be exposed for as short a time as possible, both before and after fumigation. Experience shows that much injury has resulted from such exposures.

6. No nurseryman shall use chemicals other than those sent from the Agricultural College, Guelph, except by special permission of the Inspector.

7. Nurserymen should bear in mind that a certificate of fumigation must be attached to every package of nursery stock sent from the nursery.

8. No fumigation house is to be used for fumigation purposes until sanction has been obtained from the Inspector.

Regulations for the Fumigation of Nursery Stock.

The following regulations have been prescribed by order of the Lieutenant-Governor in Council, in accordance with the provisions of the San Jose Scale Amendment Act, passed April 1st, 1899.

1. Fumigation must be carried on in a box, room, compartment, or house, suitable for the purpose, which must be air-tight and capable of rapid ventilation. The owner or proprietor will notify the Minister as soon as preparation for fumigation is complete. The Minister will thereupon order an inspection of the fumigation appliances. No fumigation under the Act is to be carried on until such inspection has been made and a satisfactory report sent to the Minister.

2. The Inspector, after examining and measuring the box or house, or other compartment in which fumigation is to be carried on, will prescribe the amounts of material to be used for every fumigation, and the instructions as to the same must be carefully followed out. The Inspector may, if thought advisable, supply the material for each fumigation in weighed packages.

3. The fumigation house (which shall include all apparatus or appliances used in the fumigation, such as generators, etc.) is to be subject to the orders of the Minister on the recommendation of the Inspector. Subject to the approval of the Inspector, the fumigation house may be on other lots than those on which the nursery stock are growing.

4. The fumigation is to be by hydrocyanic acid gas, produced according to the instructions of the Inspector and from such formulas as he prescribes for the purpose.

5. The fumigation is to be continued for a period of not less than forty-five minutes. After the expiration of this time, or longer, and when fumigation is complete, the house is to be thoroughly ventilated for fifteen minutes at least.

6. No person is to be allowed to enter the fumigating house until after the ventilation period has expired. Entering before may prove injurious, if not fatal, as the gas is a deadly poison.

7. The fumigation of buds and scions may be done in fumigation boxes of not less than thirty cubic feet capacity, the same to be subject to inspection and approval.

8. Immediately after inspection of the fumigation house, the Inspector will report to the Minister, and the Minister or Inspector will thereupon give permission in writing for the owner or proprietor to begin fumigation.

9. The owner or proprietor of every nursery will attach to every box and to every package of nursery stock a certificate as follows, and he will furnish every purchaser who so desires a copy of the same.

Certificate of Fumigation.

This is to certify that this package of nursery stock, consisting of .....
....
....
was properly fumigated on or about the ..... day of ...., 1901, in accordance with the regulations prescribed by order of the Lieutenant-Governor-in-Council, in accordance with 62nd Victoria, Chapter 35.

....
....

Portion of the San Jose Scale Act.

The following are the sections of the San Jose Scale Act dealing with the fumigation of nursery stock, 62nd Victoria, Chapter 35 :

3. No person shall import or bring, or cause to be imported or brought, into the Province of Ontario, for any purpose whatsoever, any plant infested with scale.

4. No person shall keep, or have, or offer for exchange or sale, any plant infested with scale.

5. The owner of proprietor of any nursery shall not send out, or permit any plant to be removed, from his nursery, without the same first being fumigated by hydrocyanic acid gas, in accordance with regulations prescribed by order of the Lieutenant-Governor-in-Council. 62 Vic., Chap. 35.

6. No person shall sell, or dispose of, or offer for sale, any plant obtained, taken or sent out from a nursery unless the said plant has previously been fumigated in accordance wtih these regulations. 62 Vic., Chap. 35.

7. In case the Inspector finds scale in any nursery and so reports to the Minister, the Minister may thereupon inform, by writing, the owner or proprietor or manager of said nursery of the existence of scale in his nursery, and the owner or proprietor or manager of said nursery shall not thereafter permit any plant or plants to be removed from the said nursery until the Inspector reports to the Minister that it is safe in the public interest to permit the said nursery stock to be removed after fumigation. 62 Vic., Chap. 35.

The Story of Fumigation by Hydrocyanic Acid Gas.

Fumigation in the Orchard:

The use of hydrocyanic acid gas as an insecticide dates from 1886. In that year Mr. D. W. Coquillet of the U.S. Department of Agriculture began experimenting against the scale insects of the California citrous orchards with carbon-bisulphide, arseniuretted hydrogen, and hydrocyanic acid gas. Of these three gases, only the last was found effective, and the others were discarded.

In the first experiment, the foliage as well as the insects suffered, but after a time, as the properties of the gas became better known, fumigation under tents became practicable.

In the first experiments unrefined potassium cyanide was used, and the results were very variable. Consequently it became necessary to use refined or pure cyanide to obtain uniformity in the results. It was at this time, too, that night fumigation was found to be the best for tent work, for sunlight decomposed the gas with the formation of other gases which injured the trees.

For some years the fumigation of orchard trees (chiefly orange, lemon, and allied plants) was confined to California, but in 1894 Mr. Coquillet applied the method in an orchard in Virginia.

In 1897 Prof. W. G. Johnson of the Maryland Agricultural College Experiment Station, started a series of experiments in the orchards on the fumigation of deciduous trees. The work was continued in 1898, and very valuable results were secured. For example, he determined the physiological effect of the gas on the trees, at different seasons, when there is a great difference in the functional activity of the trees, at different hours of the day when there is a varying amount of light, and with different strengths of the gas according to the amount of cyanide used; he determined the effect

of varying amounts of the gas on the San Jose Scale; and he determined to what extent fumigation was practicable in our deciduous orchards. Prof. Johnson showed that fumigation was virtually practicable only with small trees, and could not be expected to take the place of spraying in the case of large trees, although trees 15 to 17 feet high were successfully fumigated by means of his box-tents.

More recently Mr. V. H. Lowe of the New York Agricultural Experiment Station has been using in orchard work against the Scale a specially devised box-fumigator (Figs. 1, 2, 3). One side being removable, the box can be adjusted to a tree without much difficulty. It consists essentially of a frame covered with oiled 8-ounce duck, or heavy unbleached sheeting, which is sewed together in such a way that the

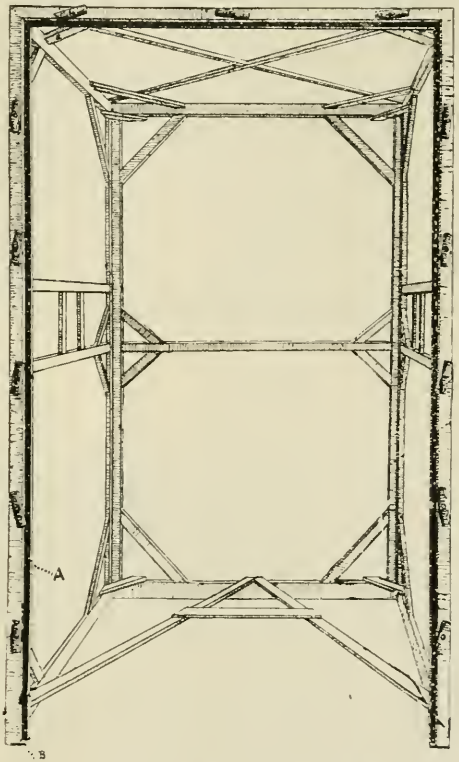

FIG. 1. PLAN OF FRAME OF LOWE'S FUMIGATOR.
(*Bull. 181 N. Y. Ag. Exp. St.*)

three sides were covered with one large sheet. The movable side of the fumigator is readily put on and taken off.

In a letter of January 31, 1902, Mr. Lowe states :—"Recently, however, we have made a decided improvement in the method of fastening the door. Instead of using buttons we have provided cross strips which extend across the door to the sides of the fumigator. The projecting ends are cut at an angle, and rest against corresponding surfaces of blocks fastened to the side strips of the fumigator. When the door is in place, and is being forced into position, the downward pressure brings it against the supporting sides, top and bottom of the fumigator."

Dr. E. P. Felt, New York State Entomologist at Albany, during 1900 made a large number of experiments in the orchard with tents similar to those used by Prof. Johnson.

Dr. Felt's tent consisted of a rectangular frame 6 x 6 x 8 feet, covered with 8-ounce duck, thoroughly oiled with boiled linseed oil, and a fixed pyramidal hood 7 feet high. The tent was lifted with a 30-foot pole and an 8-foot gaff, and dropped over

FIG. 2. PLACING LOWE'S FUMIGATOR OVER A TREE.
(*Bull. 181 N. Y. Ag. Exp. St.*)

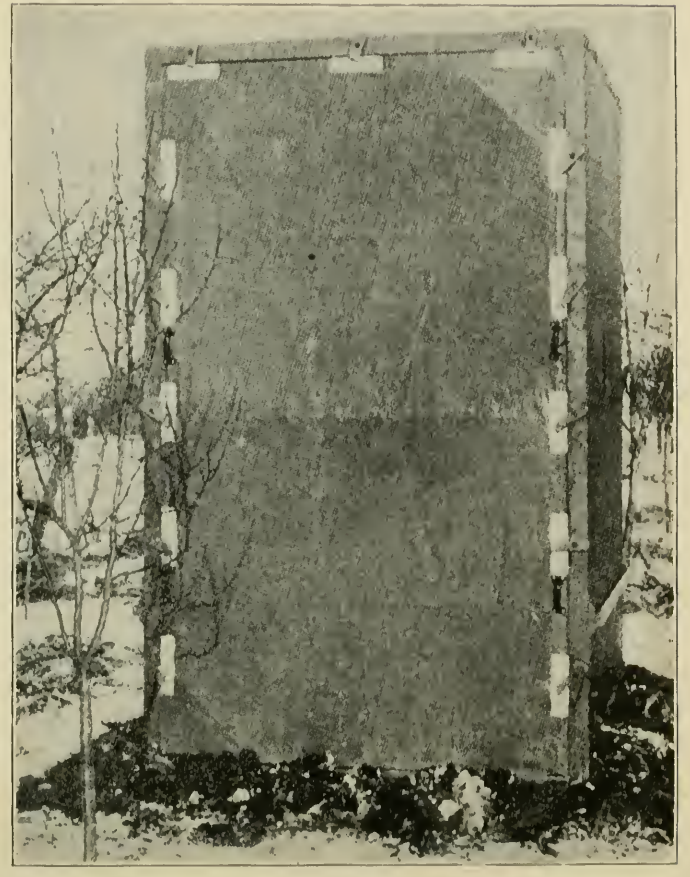

FIG. 3. LOWE'S FUMIGATOR IN OPERATION: SHOWING DIRT THROWNABOUT BASE.
(*Bull. 181 N. Y. Exp. St.*)

the tree to be fumigated. Such a tent and apparatus for handling it cost $38.00, and Dr. Felt says that were it not for this excessive cost the system of fumigation in the orchard would be practicable. (Fig. 4.)

It is probable that this mode of fumigation will be used more extensively hereafter in treating peach trees and other small deciduous trees for the San Jose Scale.

Our own experiments in Ontario point to a growing usefulness of hydrocyanic acid gas in the orchard.

Fumigation in the Nursery :

To California belongs the credit of having first used hydrocyanic gas in the treatment of nursery stock, but to the Division of Vegetable Pathology and Physiology, Washington, belongs the credit of having first used it in the Eastern part of the Continent for the same purpose.

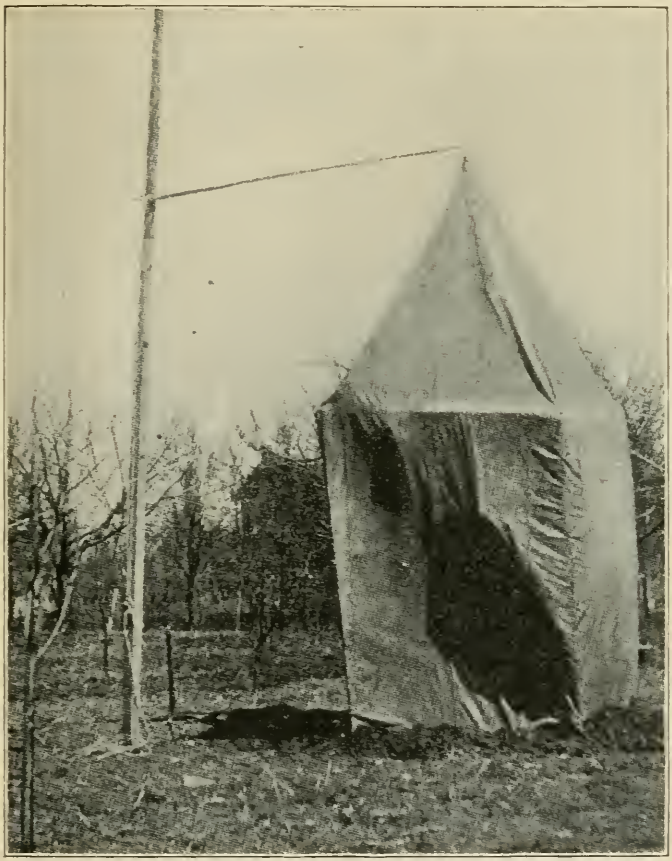

FIG. 4. FELT'S FUMIGATING TENT IN OPERATION.
(After Felt Bull. 36 N. Y. State Museum.)

After the preliminary experiments, Entomologists throughout the country were not slow to see the value of the great discovery, and a host of experimenters were soon at work seeking to determine all the conditions surrounding the problem of fumigation of nursery stock. Among the most prominent workers was Prof. W. G. Johnson, of Maryland, who had already done good service in working out the problem of orchard fumigation. He superintended the construction of fumigation houses in Maryland, when a law was passed making fumigation of nursery stock compulsory. These houses became patterns for those built later in other parts of the country.

As a result of Prof. Johnson's experiments we now know (1) the amount of cyanide potassium to use for each 100 cubic feet, and (2) the effects of the gas on various kinds of fruit trees.

To Prof. Webster of Ohio we are indebted particularly for the elaboration of perhaps the best method of liberating the gas in the house. He advised the use of slatted floors, the generation of the gas under the floor, and a special contrivance for dumping the cyanide into the acid and water in the generator. (Fig. 5 B.)

During the past year considerable attention has been paid to the question of diffusion of hydrocyanic acid gas within the fumigation house. In the early experiments, it was tacitly assumed that the gas diffused itself almost instantaneously throughout the house, but some doubts have been raised as to the correctness of this assumption, for two reasons: (1) The inter-diffusion of two gases like carbon-dioxide and hydrogen, differing greatly in weight, has been shown to be not instantaneous; and as the density of hydrocyanic gas is nearly the same as that of air it is very probable that the diffusion of these gases will be much slower; (2) The unequal effects of fumigation which have been occasionally observed in houses filled with stock.

This subject will, however, be discussed at greater length in a later section of this report.

Fumigation in the Greenhouse:

The value of hydrocyanic acid gas in greenhouses was first shown by Prof. Woods and Mr. Dorsett of the Division of Vegetable Pathology and Physiology, Washington, in 1895. Although the experiments of these gentlemen were entirely successful, yet the fact that it is unsafe to fumigate a greenhouse containing a mixed lot of plants, for some plants are more susceptible to injury than others, has had a deterring effect on the general adoption of the method.

Moreover, the same plants at different seasons and in different parts of the country do not always respond in the same way to fumigation by hydrocyanic acid gas.

By a little careful preliminary experimentation, however, it should be possible to treat greenhouses without danger to the plants.

Messrs. Woods and Dorsett in their bulletin (Circular No. 37) give a list of greenhouse plants with the corresponding amounts of cyanide which could be used with safety.

Fumigation of Flour Mills, Granaries, etc.:

To Prof. Johnson we are again indebted for the elaboration of a successful method for the fumigation of flour mills. The first test on a large scale was made by him in a three-storey brick mill in Pennsylvania in June, 1899, with the result that the weevil was practically exterminated. Later tests were made to kill the Mediterranean Flour Moth, with very gratifying results.

The same formula is used in mill work as in the nurseries, and the method of fumigation is simple. In mills of more than one storey, the upper storey should be treated first, then the next lower, etc., for the gas has a tendency to rise, and the operator has plenty of time to escape without danger from the gas.

Experiments conducted by myself two years ago revealed the fact that insects torpid with cold are not readily killed by hydrocyanic acid gas. In mills which are unheated, therefore, fumigation should be done during the summer months only, but if the temperature of the various parts of the mill is sufficiently high to allow the insects to breed uninterruptedly then fumigation may be done at any time.

The Chemistry of Fumigation.

The generation of hydrocyanic acid gas is a chemical operation, and for this reason the process is but partially understood by nurserymen unacquainted, as the most of them are, with chemical actions.

As I explained in my last report, the gas is liberated by the interaction of the sulphuric acid and the potassium cyanide. Another substance, potassium sulphate, is also formed at the same time in the generator, and the use of the water is to keep this substance in solution, and to prevent it coating over the potassium cyanide. In such a case further interaction of the acid and cyanide would be stopped. if no water were added, therefore, action would soon stop, and all the gas would not be liberated.

Moreover, the rapidity of evolution of the gas depends upon the degree of fineness of the cyanide used. When the cyanide is present in large lumps not so much of it comes into contact with the acid, and the chemical action keeps up for some considerable time; but if the cyanide is ground small, more of it is exposed to the acid at once, and the action is more intense but of shorter duration.

For example, I found when I used 9 fl. oz. of water, 14 fl. oz. of acid, and 6 oz. of cyanide composed of fragments 1 1-2 inches each way, the action lasted for nearly ten minutes; but when the cyanide was ground somewhat finely, the action lasted but three or four minutes. The same volume of gas, however, was liberated in each case.

Some nurserymen are of the opinion that but little gas is liberated when the cyanide is added to a cold mixture of acid and water. Such is not the case, for the same volume of gas will be evolved whether the solution is hot or cold. The action, however, will be less violent and will last much longer.

My attention was called in the autumn to the fact that one or two nurserymen used their cyanide tins as generators. It is needless for me to state that the use of such generators is contrary to the Regulations issued by the Department. The tins are soon eaten by the acid, but some acid is used up in doing so. Other gases—hydrogen and sulphur dioxide—are liberated, and a smaller amount of hydrocyanic acid gas than the normal is evolved. There is no better generator than the glazed earthenware crock, for it is both cheap and durable.

Injury to Stock.

Few reports were received during the past year regarding damage to stock by fumigation. In my last report I predicted that few complaints would be made, for I felt sure that the causes of the injury to peach stock in the two previous years were the severe winter conditions of 1898-99, and the method of handling the stock after it was dug—not the treatment received during fumigation. My own experiments and investigations, as well as those of competent authorities in the United States, were to my mind conclusive on this point.

During the course of my inspection, I frequently came across small shipments of nursery stock exposed carelessly at railroad stations to the changing conditions of early spring and late fall. I am convinced that sufficient injury is done to the roots of trees treated in that way that recovery after planting becomes impossible. I have frequently also seen agents selling trees in market places, where the roots were openly exposed for several hours. In such cases the roots become dried out, and death ensues.

A successful nurseryman of many years standing, to whom I mentioned the matter of the death of nursery stock, said that in ordinary years more trees died from a drying-out of the roots after digging than by any other way, and he was extremely careful to charge his agents to expose the roots for as short a time as possible, while handling the trees.

I desire here to impress upon our nurserymen the need for greater care in handling the stock. During the ordinary operations of fumigation and packing the the roots are twice exposed, once during the digging and fumigation and again before heeling in and packing.

It is just probable that the large mortality of trees shipped to Quebec and the Maritime Provinces is due to neglect and carelessness in the handling of the trees both by the nurserymen themselves and by their agents. Nurserymen, in their own

interests, should see to it in future that no complaints can possibly arise from this source.

On October 13th, 1900, I had sent me a consignment of nursery plum stock infested with Scale, for the purpose of determining the effects of hydrocyanic acid gas on both the trees and the Scale. For purposes of experiment, I divided the 41 trees into three lots, 12, 12, and 17 in each respectively. Lot I was fumigated with the usual formula, viz., 25-28 oz. cyanide, 1 1-2 fl. oz. sulphuric acid, and 2 oz. water per 100 cubic feet space for the usual time, 45 minutes, then was planted in the garden.

Lot II. was fumigated with the two-thirds normal dose, viz., 2-3 oz. cyanide, 1 fl. oz. sulphuric acid, and 1 1-2 fl. oz. water per 100 cubic feet for the normal time, and planted beside Lot I.

Lot III. was fumigated with double the normal dose. viz., 1 7-8 oz. cyanide, 2 3-4 oz. acid and 4 oz. water, for the normal time, and planted beside Lots I and II.

These trees were all examined carefully several times for living scale, once during the winter. and again in May, June and July; but no living scale could be found. Every tree survived and look thrifty and strong when they were last examined in July, just prior to their destruction.

These trees received no special care. beyond that their roots were exposed as little as possible. and were planted in the fall when conditions are perhaps not so favorable as they are in the spring, yet they came through all right without a single loss.

At my suggestion Mr. W. N. Hutt, Assistant Inspector, began a series of experiments in November, 1901, on many kinds of nursery stock—peaches, apples, plums, currants, roses and cherries. Various strengths of the gas were used, and untreated duplicates as checks were heeled in or planted like the others. The results of these experiments ought to be instructive and conclusive. as the stock was subjected to almost every condition possible in modern nursery practice.

The results, however, will not be known until the fall of 1902.

The Diffusion of Hydrocyanic Acid Gas in a Fumigation House.

In a previous section. I hinted that possibly hydrocyanic acid gas may not diffuse uniformly throughout a fumigation house; in other words, that it may be more dense in some parts than in others. This theory has actually been proposed to account for the unequal effects produced on nursery stock fumigated in the same house, which some nurserymen claim to have observed.

This question has been taken up by several experimenters during the past year. The results seem to show that little danger need be feared from the "banking" of gas in a fumigation house if the generator is placed under the floor and near the middle of the room. Although the gas on its liberation from a centrally placed generator does not spread instantaneously to all parts of the house, yet the distribution is extremely rapid. and the density of the gas becomes practically uniform throughout the house in a few minutes.

It is almost certain. however, that the gas does not diffuse as rapidly in a house filled with trees as in an empty one, for the close packing of the trees must naturally interfere with the rapid distribution of the gas. Prof. Woods of Washington tells me that the lateral diffusion of the gas was more than 25 feet in a minute in a large greenhouse which he was fumigating.

Professors Sanderson and Penny of the Delaware Agricultural Experiment Station, who have been doing excellent work on this problem of the diffusion of hyrocyanic acid gas in an enclosed space, report that in a box of 60 cubic feet capacity there is at first "an excess of gas around the generator. Within two minutes time this excess disappears. leaving only one-third of the normal quantity of gas near the generator, while 2 1-2 times the normal quantity is formed at the opposite end of the fumigating box. This excess rapidly diminishes and the gas increases in density around the generator, so that a tendency toward equilibrium is noted, although more than 20 minutes is required for the establishment of a perfect equilibrium."

In a large room of 4,332 cubic feet capacity Professors Sanderson and Penny determined the circulation of the gas to be as follows: The gas rises vertically from the generator, follows the ceiling, descends on the opposite side of the room and completes the circuit by returning to the generator.

They found that when the generator was placed in one corner of the room considerable time elapsed (30 to 60 minutes in their house of 4,332 cubic feet capacity) before the gas became evenly diffused, but when the generator was placed in the centre of the room diffusion was practically complete in 10 minutes. These results

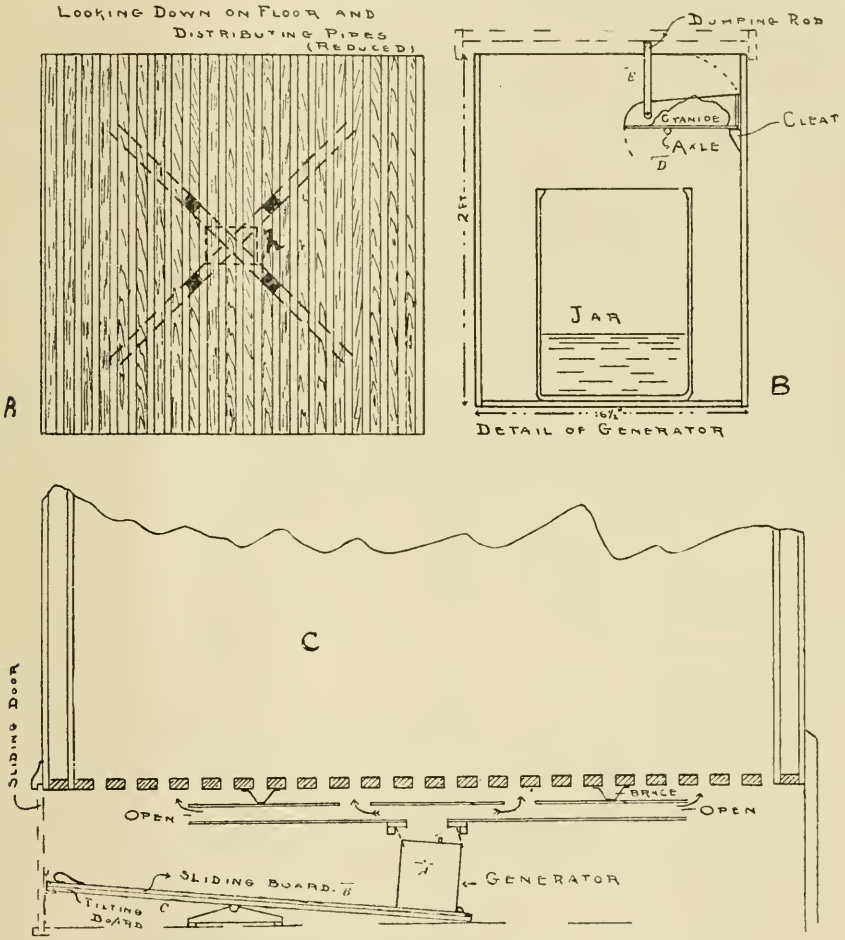

Fig. 5. Diagram of arrangement of Sanderson and Penny's Fumigation house.

A shows the distribution of the tubes attached to hood (h) on generator placed under the slat floor; B shows how the cyanide may be dumped into generator; C shows another view of the distribution of the tubes under the slat floor.

(*After Sanderson and Penny.*)

seemed to indicate that if the gas could be set free from several points instead of one diffusion would be much more rapidly completed. Messrs. Sanderson and Penny arranged over the generator a tin hood with four pipes leading away from it towards the corners of the room (Fig. 5) under a slat floor.

The same experimenters determined the absorbent effect of fresh soil. They found that in the case of a fumigation box resting on soil about 62 per cent. as much gas is available as in a closed box. They say: "It would seem necessary then, in

work of this sort over soil to use nearly twice as much cyanide and other reagents as if a closed box."

Professors Sanderson and Penny are to be congratulated on their valuable contributions to the difficult, and hitherto little known subject of diffusion of hydrocyanic acid gas in a closed space.

Professors Webster, Johnson, Woods and Waite also recommend the use of slat floors (Fig. 5 c.) for then the loose earth from the trees will not deposit upon the slats, and every part of the tree can be thoroughly fumigated. When there is considerable loose dirt upon the floor, and the trees are piled upon it, some of them are more or less buried. If the generator is placed under the slat floor there is not that impediment to the free distribution of the gas that there is when the gas is generated on the earth floor and at one end of the building.

General Recommendations.

Whereas the San Jose Scale is still with us in certain districts in alarming numbers, and threatens to spread to the nurseries in spite of special treatment with crude petroleum and whale-oil soaps; and whereas it is the opinion of the Inspectors that there are probably fruit-growers within the Province who do a small nursery business without our knowledge, I beg to recommend that .

I. The Inspector be allowed to appoint official fumigators to superintend the work of fumigation at the nurseries. Certain nurseries could be grouped together, and the fumigation controlled by a single man, thus lessening the expense.

II. All nurserymen be compelled to register with the Department of Agriculture every year, stating the nature of the stock which they are offering for sale.

It is quite probable that there are nurserymen doing business without the knowledge of the Department. It is but justice to those nurserymen who are honestly complying with the Regulations that they should be protected from the small grower who grows perhaps only one variety of stock and can put it on the market and underbid the regular nurseryman because he is relieved of the expense of fumigation.

Some Points that should be Remembered by Nurserymen.

1. Never allow a tree grown by you to get out of your nursery before it is fumigated.
2. Do not fumigate trees until the wood is well matured and the buds thoroughly dormant.
3. Never fumigate trees after the buds have begun to open in the spring.
4. Never expose the roots of trees longer than is absolutely necessary.
5. Send in your orders for chemicals early, and state clearly the number of doses of each formula required.
6. Never fumigate apples, pears, plums, quinces, etc., according to second formula
7. Repair your fumigation house early before the Inspector calls.
8. The Inspector will probably begin work about March 15th, and Sept. 15 in the Niagara region.
9. Never leave the cyanide or the acid where children can reach it.
10. Never allow the residue after fumigation to remain long in the crock or generator.
11. Never put a new charge in a generator containing the old residue.
12. Never use tin or iron vessels as generators, they will be rendered useless in a few minutes.
13. Never allow any one to enter a fumigation house under ten or fifteen minutes after the doors and ventilators are open.
14. Never omit to attach the certificate of fumigation to every parcel of stock shipped.

WM. LOCHHEAD,
Inspector of Fumigation Appliances.
O. A. C., Guelph.

A LIST OF THE NURSERIES OF ONTARIO, 1901

Morris, Stone & Wellington, Fonthill....	Fumigation houses, 2,800 cub. feet.
Stone & Wellington, Toronto	do at M. S. & W.
E. P. Blackford & Co.....	do do
Pelham Nursery Co., Fonthill	do do
B. W. Secord, Fonthill	do house, 750 cub. feet.
J. E. Crow, Ridgeville	do house, 560 do
J. W. Page do	
H. A. McCoomb, Ridgeville	do at M. S. & W.
F. Walker, Virgil.....	do house, 866 cubic feet.
G. B. Wilson, do	
W. Lee & Son, do	do house, 2,100 cubic feet.
Angus Shaw, do	
Esau Hube, St. Davids	
E. Morden, Niagara Falls South	do box, 120 cubic feet.
Smith & Reed, St. Catharines	do house, 1,550 cubic feet.
A. G. Hull & Son, do	do do 960 do
Alex. Glass, do	do do 240 do
Neil Buchanan. do	
J. J. Collins, do	do do 460 do
Brown Bros. Co , Brown's Nurseries	do do 6,400 do
Chase Bros. Co., Colborne	do by Brown Bros. Co.
F. W. Bowman & Son Co., Toronto.....	do do
E. D. Smith, Winona	do house, 2,300 cubic feet and box.
R. R. Smith, do	Using E. D. Smith's.
Geo. Chambers, do	Fumigation house, 1,056 cubic feet.
C. P. Carpenter & Son, Winona	do do 1,318 do
W. F. Geddes, Winona	do by C. P. Carpenter & Son.
F. B Henry, do	do by E. D. Smith.
J. E. Henry, do	do by E. D. S. and C. P. C. & Son.
I. E. Vanduzer, do	
Winona Nursery Co., Winona	do in E. D. Smith's.
Brown Bros do	do do
Grimsby Nursery Co., Grimsby.....	do by C. P. Carpenter & Son.
W. Smith do	do by E. D. Smith.
W. A. Holton, Hamilton	do house, 640 cubic feet.
Webster Bros., do	do do 240 do
Haskins Wine Co. do	do do 642 do
Ward Bros., Bartonville....	do by Haskins Wine Co.
J. W. Burns, Stoney Creek	
Brock Galbraith, do	do house, 320 cubic feet.
Fruitland Nursery Co., Fruitland	do and box, 1,620 and 70 cubic feet.
H. H. Hurd, Hamilton	do house, 1,700 cubic feet.
M. I. Davidson, Burlington	do by Hurd & Haskins.
S. T. Anderson, Waterdown	do by Hurd.
Cavers Co., Galt	do by Caldwell & Co.
Caldwell & Co., Galt	do house, 1,300 cubic feet.
H. L. Janzen, Berlin	do box, 90 cubic feet.
M. Milgau, Bright	do house, 1,377 cubic feet.
E. Hersee, Woodstock.....	do do 630 do
A. W. Graham, St. Thomas	do do 62 do
H. L. McConnell, Grovesend.....	do do 160 do
C. A Baker, London	do do 510 do
D. Dempsey, Stratford	do do 100 do
J. McAinsh, Wellburn.....	do do 145 do ; box 52½ c.ft.
Strathroy Nursery Co., Strathroy.....	do do 1,075 do
Estate of J. Stewart, Goderich	do do 300 do
J. W. Skinner, Mitchell	Evergreens.
Chas. Ellis, Meaford.....	Fumigation do 475 do
J. H. Wismer, Port Elgin	do do 900 do ; box 45 c. ft.
W. Fleming, Owen Sound	do do 500 do
S. H. Newman, do	do do 250 do
T. C. Robinson, do	Using S. H. Newman's house.
M. W Robinson, Kettleby.....	Fumigation house, 300 cubic feet.
Leslie Nurseries, Toronto	do do 1,760 do
Steele, Briggs Seed Co , Toronto	do do 75 do

W. Rennie & Sons, Toronto				
J. A. Simmers, do				
A. Gilchrist, Toronto Junction				
Manton Bros., Eglinton				
Mr. Hogg, Eglinton				
Granger Bros, Deer Park, Toronto				
Stanley Spillett, Nantyr				
R. Breckon, Toronto				
Colin McDonald, Toronto, 1,164 Queen St. East	Fumigation 305 cubic feet.			
W. L. Clarke, Leamington				
Thos. Rowley, do	do	box, 36 cubic feet.		
Geo. D. Ellis, do	do	216	"	
Dennis Smith, do				
E. E. Adams, do				
A. Fox & Son, do				
J. Mitchell, do				
S. Ward Kennedy, do				
C. B. Palmer, Kingsville				
Geo. E. Jones, do				
B. Jasperson, do	Fumigation box, 480 cubic feet.			
Geo. Cady, Ruthven	do	house.		
McKenzie, Ross & Sons, Chatham	do	do	75	cubic feet.
F. W. Wilson, Chatham	do	do	1,325	do
N. E. Mallory, Guilds	do	do	144	do
N. T. Selby, Newcastle	do	do	560	do
R. J. Mackie, Oshawa	do	do	385	do
L. K. Shourds, Wellington	do	do	1,000	do
Wallace Woodrow, Picton	do	do	500	do
W. C. Reid, Belleville	do	do	190	do
J. W. Johnston, Campbellford	do	do		
H. A. McIntosh, Dundela	do	do	72	do
Thos. Dangerfield, Kemptville	do	do	640	do
John Conn, do	do	do	640	do
W. J. Kerr, Renfrew	do	do	36	do
David Tait, Iron Bridge, Algoma	do	do		
Mr. Campbell, Simcoe				
Mr. Turner, Scotland				

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